



FRIDAY, OCTOBER 29.

Train Accidents in September.

The following accidents are included in our record for the month of September:

COLLISIONS.

REAR.

1st, a. m., freight on Blodgett logging road at Grayling, Mich., broke in two, and the detached cars ran down a steep grade and into train taking water, wrecking engine and killing engineer and fireman.

2d, a. m., freight on New York & New England broke in two near Millville, Mass., and rear section ran into forward one, wrecking 7 cars.

3d, a. m., freight on Michigan Central broke in two near Townsend, Ont., and rear section ran into forward one, wrecking three cars and injuring a brakeman.

5th, very early, freight on Western & Atlantic ran into cars broke loose from preceding freight near Kingston, Ga., damaging several cars.

5th, p. m., passenger train on Baltimore & Ohio ran into rear of freight near Curtis Bay Junction, Md., damaging engine and injuring fifteen passengers slightly.

5th, night, passenger train on Boston & Lowell ran into preceding freight in Nashua, N. H., damaging several cars and injuring a trainman.

6th, p. m., passenger train on Central, of New Jersey, ran into rear of coal train near Glendon, Pa., damaging engine and 10 cars, killing the fireman, injuring engineer seriously and 3 passengers slightly. The accident was caused by operator's mistake.

7th, night, freight on Missouri Pacific ran into preceding freight near Laclede, Mo., wrecking 13 cars.

8th, p. m., passenger train on Pittsburgh & Lake Erie ran into rear of freight just going into siding in Pittsburgh, Pa., damaging several cars. A passenger standing on the platform was thrown to the ground and badly hurt.

9th, a. m., passenger train on St. Louis & Cairo ran over a misplaced switch and into work-train standing on a siding at Sparta, Ill., damaging engine and several cars.

9th, night, passenger train on Delaware, Lackawanna & Western ran into preceding freight at Richfield Junction, N. Y., damaging engine and several cars and injuring the engineer.

10th, p. m., wild engine on Delaware & Hudson Canal Co. road ran into rear of local freight stopping at Smith's Basin, N. Y., wrecking 2 cars. The wreck caught fire and two cars were destroyed; the station was also burned down.

10th, night, passenger train on Hannibal & St. Joseph ran over a misplaced switch and into freight standing on siding at Cameron, Mo., wrecking several cars and injuring 2 trainmen slightly.

12th, very early, freight on New York, Lake Erie & Western ran into preceding freight near Hillburn, N. Y., damaging several cars. It is said that the signal was not sent back far enough by the first train.

12th, p. m., freight on New York, Lake Erie & Western ran into preceding freight near Coshocton, N. Y., damaging several cars.

13th, a. m., passenger train on Cincinnati, New Orleans & Texas Pacific, ran into rear of shifting freight at Ludlow, Ky., damaging engine and 8 cars, and injuring engineer fatally.

15th, p. m., freight on Chicago, St. Louis & Pittsburgh ran into preceding freight in Indianapolis, damaging several cars.

15th, a. m., freight on Albany & Susquehanna ran into preceding freight at Schoharie Junction, N. Y., damaging several cars and injuring a brakeman.

16th, night, passenger train on Cleveland, Columbus, Cincinnati & Indianapolis ran into rear of freight near Columbus, O., wrecking engine and several cars and injuring a brakeman in the caboose.

17th, a. m., freight on East Tennessee, Virginia & Georgia ran into a passenger train which had stopped near Chattanooga, Tenn., damaging several cars.

19th, night, freight on Missouri, Kansas & Texas ran into preceding freight near Kiowa, Ind. Ter., damaging several cars.

21st, a. m., freight on New York, Lake Erie & Western broke in two near Cameron, N. Y., and rear section ran into forward one, damaging several cars.

21st, a. m., work train on New York Central & Hudson River ran into rear of freight near Lockport, N. Y. Three laborers were slightly hurt. The collision is said to have been caused by a misunderstanding of signals.

21st, night, passenger train on Chesapeake & Ohio ran into rear of shifting freight in Richmond, Va., wrecking several cars and injuring a fireman.

21st, night, passenger train on Baltimore & Ohio ran over a misplaced switch and into freight standing on siding in Locust Point yard in Baltimore, damaging engine and 2 cars.

22d, very early, freight on Oregon Railway & Navigation Co. road broke in two near Bonneville, Ore., and rear section ran into forward one, damaging several cars and injuring brakeman.

22d, p. m., passenger train on Baltimore & Ohio ran into rear of freight which was just pulling out of a siding at Germantown, Md., damaging engine and 2 cars and injuring 2 trainmen.

22d, p. m., freight on Boston & Albany ran into rear of pay train, which had stopped near State Line, Mass., damaging the pay car and injuring the paymaster.

23d, a. m., freight on Grand Trunk ran into preceding freight near Toronto, Ont. There was a dense fog at the time.

23d, p. m., freight on Pennsylvania Railroad ran into preceding freight near Johnstown, Pa., damaging engine and 6 cars.

24th, a. m., freight on Allegheny Valley ran into preceding freight near Logansport, Pa., wrecking several cars loaded with oil. The wreck caught fire and was destroyed.

26th, a. m., passenger train on Union Pacific ran into rear of freight which had stopped at Fremont, Neb., wrecking several cars.

27th, p. m., coal train on Delaware, Lackawanna & Western ran into preceding freight in Buffalo, N. Y., damaging several cars.

28th, night, freight on Chicago, Milwaukee & St. Paul ran into passenger train which had stopped near Watertown, Wis., for a hot box. A passenger car was wrecked, 1 passenger seriously and 1 slightly hurt.

19th, night, freight on St. Paul, Minneapolis & Manitoba broke in two near Clear Lake, Minn., and rear section ran into forward one, damaging several cars.

30th, early, freight on Boston & Albany ran into preceding freight near Wellesley, Mass., damaging several cars and injuring a trainman. There was a dense fog at the time.

30th, a. m., freight on New York Central & Hudson River

ran into preceding freight near Palmyra, N. Y., wrecking 6 cars.

30th, night, freight on Michigan Central broke in two near Niles, Mich., and rear section ran into forward one, wrecking 2 cars and injuring 2 trainmen.

BUTTING.

3d, very early, butting collision between freight and wild engine on New York Central & Hudson River near Marcelus, N. Y., wrecked both engines and 12 cars.

4th, p. m., butting collision between passenger and freight trains on Wilmington & Northern, near Dupont, Del., wrecked both engines and several cars, and injured 2 trainmen badly.

5th, a. m., butting collision between two freights on Galveston, Harrisburg & San Antonio near Lacoste, Tex., damaged both engines and 6 cars, injured a fireman. The accident was caused by a dispatcher's mistake.

11th, a. m., butting collision between two freights on Chicago, Burlington & Northern near Potosi, Ill., wrecked both engines and several cars, injuring 5 trainmen.

11th, a. m., butting collision between two passenger trains on Missouri Pacific near Fort Worth, Tex., damaged both engines and a car slightly.

12th, a. m., butting collision between freight and work-train on Chicago & Eastern Illinois near Danville, Ill., damaged both engines and 12 cars.

14th, a. m., butting collision between excursion and freight trains on New York, Chicago & St. Louis near Silver Creek, N. Y., wrecked both engines and forced baggage and smoking cars together, wrecking them completely, killing 13 passengers, injuring 7 others fatally and 13 less severely. Said to have been caused by engineer of excursion train forgetting order to meet freight at Silver Creek.

18th, night, butting collision between two freights on Union Pacific at Gilmore, Neb., wrecked both engines and several cars, killing a fireman and injuring an engineer. One of the trains neglected orders to wait for the other.

18th, night, butting collision between two freights on Missouri, Kansas & Texas near Clayton, Mo., wrecked both engines and 20 cars.

21st, very early, butting collision between two freights on Chicago & Northwestern at Eyota, Minn., damaged both engines, 5 cars and injured engineer.

21st, night, butting collision between passenger and freight train on St. Louis, Iron Mountain & Southern near De Soto, Mo., damaged both engines, several cars and injured 2 trainmen.

22d, a. m., butting collision between two freights on Missouri Pacific near Independence, Mo., wrecked both engines and 10 cars, killed 2 trainmen and injured 2 others.

25th, very early, butting collision between passenger and freight train on Indiana, Bloomington & Western near Laura, O., wrecked both engines and baggage car and 12 freight cars. One trainman was killed, 1 badly hurt, and 7 passengers were slightly injured.

27th, a. m., butting collision between freight and passenger train on Chicago, Milwaukee & St. Paul near Spencer, Ia., wrecked both engines and several cars, injuring a passenger.

27th, p. m., butting collision between two freights on Burlington & Missouri River near Louisville, Neb., damaged both engines and 15 cars.

28th, a. m., butting collision between two freights on Missouri Pacific at Montevue, Mo., wrecked both engines and 15 cars and injured 2 trainmen.

29th, night, butting collision between two freights on Norfolk & Western near Burkville, Va., damaged both engines and 3 cars. The accident was caused by an operator's mistake.

CROSSING.

2d, p. m., Minneapolis & St. Louis freight ran into Chicago, Milwaukee & St. Paul passenger at crossing at Norwood Junction, Minn., damaging a car and injuring 3 passengers slightly.

7th, a. m., Delaware, Lackawanna & Western freight ran into Buffalo, New York & Philadelphia freight at the crossing in Buffalo, N. Y., damaging 5 cars.

27th, a. m., Pittsburgh & Western passenger train ran into Valley Railroad freight at the crossing in Akron, O., damaging engine and 2 cars.

DERAILMENTS.

BROKEN RAIL.

25th, a. m., passenger train on Chicago, Burlington & Quincy struck a broken rail near Clarendon Hills, Ill., and rear car was thrown from the track and upset, killing 1 passenger, injuring 5 others seriously and 15 slightly.

BROKEN OR DEFECTIVE FROG.

2d, very early, passenger train on Boston, Hoosac Tunnel & Western was derailed at Eagle Bridge, N. Y., by a defective frog.

6th, night, freight on Houston & Texas Central was derailed near Houston, Tex., by defective frog.

18th, a. m., car of freight on Old Colony was derailed in New Bedford, Mass., by defective frog.

BROKEN BRIDGE.

6th, a. m., freight on Toledo & Ohio Central broke through a small wooden bridge near Toledo, O., and engine went down into the river.

24th, night, freight on New York, Susquehanna & Western broke through the bridge over the Passaic River at Dundee Lake, N. J., one span of the bridge and 6 cars going down into the river. The span which went down had only been erected a short time, and from the position of the wreck it is believed that a car was derailed just before reaching the bridge and struck the end post of the span, knocking it down. The guard rails had not yet been put in place.

SPREADING OF RAILS.

5th, p. m., freight on Union Pacific was derailed near Milford, Kan., by spreading of the rails, and engine upset, injuring engineer, fireman and a man who was riding on the engine.

13th, a. m., freight on Texas & Pacific was derailed near Holland, Tex., by spreading of the rails.

15th, night, freight on Missouri Pacific was derailed in St. Louis by spreading of the rails, and 10 cars were piled up in a bad wreck, knocking down a small house standing by the track.

16th, p. m., coal train on New York, Lake Erie & Western was derailed near Hawley, Pa., by spreading of the rails.

23d, night, freight on Grand Trunk was derailed near Glencoe, Ont., by spreading of the rails.

27th, night, freight on Buffalo, New York & Philadelphia was derailed near Oil City, Pa., by spreading of the rails. The engine went down the bank, injuring 5 trainmen.

28th, p. m., freight on Central Vermont was derailed at Northfield, Vt., by spreading of the rails.

BROKEN WHEEL.

7th, a. m., 2 cars of freight on New York, Lake Erie & Western, were derailed near Otisville, N. Y., by broken wheel.

19th, night, freight on Chicago, St. Paul, Minneapolis & Omaha was derailed near Black River Falls, Wis., by broken wheel.

23d, early, freight on Buffalo, New York & Philadelphia

was derailed near Holland, N. Y., by a broken wheel, and 15 cars were piled up in a bad wreck in a deep cut. Six of the cars were loaded with oil, which caught fire, and the entire wreck was destroyed. A brakeman was badly hurt.

BROKEN AXLE.

3d, a. m., freight on Maine Central was derailed near Fairfield, Me., by broken axle.

6th, a. m., freight on Pittsburgh, Fort Wayne & Chicago was derailed near Rochester, Pa., by a broken axle.

11th, p. m., coal train on Lehigh Valley was derailed at Bowman, Pa., by broken axle and 30 cars were wrecked.

15th, night, freight on Troy & Boston was derailed at Johnsonville, N. Y., by a broken axle.

17th, night, freight on Buffalo, New York & Philadelphia was derailed near Cuba, N. Y., by broken axle.

24th, a. m., freight on Jeffersonville, Madison & Indianapolis was derailed in Jeffersonville, Ind., by a broken axle.

24th, p. m., freight on Wisconsin Central was derailed near Schleisingerville, Wis., by broken axle.

24th, night, engine of passenger train on New York, Lake Erie & Western was derailed near Basket, Pa., by a broken axle.

27th, a. m., freight on New York, Pennsylvania & Ohio was derailed near Red House, N. Y., by a broken axle, injuring a brakeman.

28th, night, freight on Pittsburgh & Lake Erie was derailed near Carbon, Pa., by broken axle. Three trainmen were hurt.

BROKEN TRUCK.

8th, a. m., passenger train on Georgia Railroad was derailed near Athens, Ga., by broken truck.

BROKEN DRAW-HEAD.

4th, a. m., freight on Pittsburgh, Cincinnati & St. Louis was derailed near Newcomerstown, O., by a draw-head which pulled out and fell upon the track.

BROKEN BRAKE-BEAM.

18th, night, freight on Long Island Road was derailed near Syosset, N. Y., by broken brake-beam falling on the track.

24th, night, freight on New York & New England was derailed in Hartford, Ct., by broken brake-beam dropping on the track.

25th, a. m., 20 cars of coal train on the Philadelphia & Reading were derailed at Stony Creek, Pa., by broken brake-beam dropping on the rails.

CATTLE.

15th, p. m., passenger train on East Tennessee, Virginia & Georgia ran over a cow near Chattanooga, Tenn., derailing engine and baggage car. Engine upset, killing engineer and fireman.

16th, very early, freight on Cincinnati, Jackson & Mackinaw ran over some cattle near Van Wert, O., derailing engine and 3 cars, injuring 2 trainmen.

16th, a. m., freight on Baltimore & Ohio ran over a horse on a bridge near Independence, O., and engine and 5 cars were derailed and broke through the bridge, killing the engineer and injuring the fireman and a brakeman.

LAND-SLIDES AND WASH-OUTS.

9th, very early, passenger train on Virginia Midland ran into a land-slide near Lynchburg, Va. Engine and 8 cars were derailed and 2 trainmen hurt.

10th, night, freight on Canadian Pacific ran into a land-slide near Rat Portage, Man., and engine and 10 cars were derailed and wrecked, killing 3 trainmen.

27th, night, freight on Galveston, Harrisburg & San Antonio ran into a wash-out near Comstock, Tex., and was derailed, injuring 2 trainmen.

28th, a. m., freight on Galveston, Harrisburg & San Antonio ran into a wash-out near Marques, Tex. Engine and 3 cars were wrecked, killing the engineer.

MISPLACED SWITCH.

2d, very early, freight on Burlington & Missouri River was derailed in Lincoln, Neb., by misplaced switch.

3d, night, passenger train on Portland & Ogdensburg was derailed at East Baldwin, Me., by misplaced switch, wrecking engine and baggage car, killing engineer and injuring 3 trainmen.

6th, night, freight on Southeastern of Canada was derailed at Chambly, Que., by a misplaced switch, and the engine ran into a small house, knocking it down and injuring 3 people who were asleep in the house.

8th, a. m., freight on Burlington, Cedar Rapids & Northern was derailed near Spirit Lake, Ia., by misplaced switch.

9th, a. m., passenger train on Beach Creek road was derailed near Clearfield, Pa., by misplaced switch. A car upset, killing a brakeman and injuring 2 passengers.

9th, night, freight on Union Pacific was derailed at Grand Island, Neb., by misplaced switch.

11th, p. m., passenger train on New York & New England was derailed at Jewett City, Conn., by a misplaced switch. A passenger car upset, injuring 6 passengers, besides a number slightly bruised.

13th, a. m., freight on Pennsylvania Railroad was derailed near Sharpsburg, Pa., by a misplaced switch.

13th, night, freight on St. Louis, Keokuk & Northwestern was derailed in West Quincy, Mo., by misplaced switch, wrecking engine and 8 cars and killing 3 trainmen.

18th, night, passenger train on Chicago, Milwaukee & St. Paul was derailed in Chicago by a misplaced switch.

26th, night, passenger train on Western of Alabama was derailed near Montgomery, Ala., by a misplaced switch, and the engine and a baggage car upset, killing the fireman and injuring the engineer and 2 other trainmen.

28th, a. m., freight on Baltimore & Ohio was derailed at Bladenburg, Md., by a misplaced switch. Engineer was hurt.

28th, a. m., freight on Texas & Pacific was derailed near Sherman, Tex., by misplaced switch.

29th, night, freight on Chicago, Burlington & Northern was derailed at Shabbona, Ill., by misplaced switch.

30th, early, freight on St. Paul, Minneapolis & Manitoba was derailed at Wilmar Junction, Minn., by misplaced switch, and engine and 8 cars were piled up in a very bad wreck, killing the engineer and injuring a brakeman.

OPEN DRAW.

16th, very early, freight on Illinois Central ran into open draw on the bridge over the Mississippi at Dubuque, Ia., engine and 2 cars going into the river. It is said that the signals were up, but the track was wet and slippery and the engine could not be stopped.

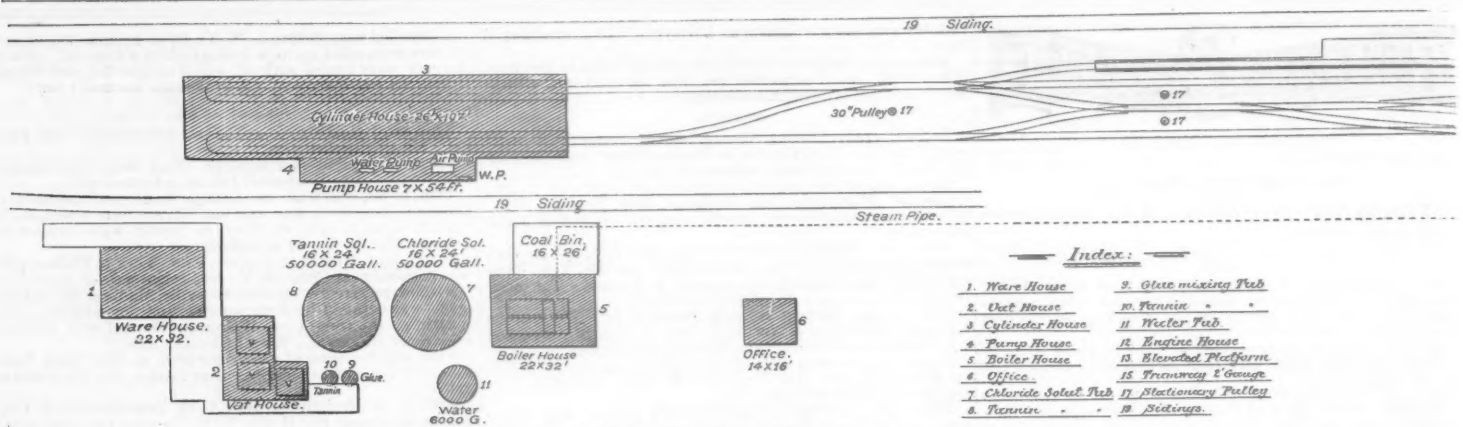
MALICIOUSLY CAUSED.

10th, very early, engine of passenger train on Staten Island Rapid Transit road was derailed near Stapleton, N. Y., by some stones piled up on the track.

10th, night, freight on Lake Shore & Michigan Southern was derailed in Chicago by purposely misplaced switch.

11th, night, passenger train on New Haven & Northampton was derailed in Westfield, Mass., by a switch which had been purposely misplaced. The engine upset, killing the engineer.

16th, very early, freight on Grand Trunk was derailed near South Lyon, Mich., where a rail had been removed from the track by persons unknown. The engine and 6 cars



TIE-PRESERVING WORKS AT LARAMIE, WYOMING—UNION PACIFIC RAILROAD.

O. CHAUNTE, Engineer.

(Continuation of yard shown on opposite page.)

were piled up in a bad wreck; killing the fireman, injuring the engineer and a brakeman.

UNEXPLAINED.

4th, very early, freight on New York, Lake Erie & Western was derailed near Cheechunk, N. Y., wrecking 5 cars.

5th, a. m., engine of passenger train was derailed in Paterson, N. J., on New York, Susquehanna & Western.

9th, p. m., engine of passenger train on New York Central & Hudson River was derailed near Cold Spring, N. Y., and damaged.

9th, night, freight on Louisville & Nashville was derailed at Harrison, Ky. A brakeman was hurt.

14th, a. m., two cars of freight on Northern, of New Jersey, were derailed near Homestead, N. J., blocking the road an hour.

19th, a. m., passenger train on Denver & Rio Grande Western was derailed in the Black Cañon, Utah. One passenger was slightly hurt.

21st, a. m., freight on Chesapeake & Ohio was derailed near Charleston, W. Va., doing some damage.

22d, a. m., 2 cars of passenger train on Oregon & California road were derailed near Oakland, Ore., damaging 1 car.

24th, a. m., car of passenger train on Pennsylvania Railroad was derailed in Philadelphia.

24th, night, passenger train on New York, Lake Erie & Western was derailed near Shin Hollow, N. Y.

25th, night, engine of coal train on Philadelphia & Reading was derailed in Philadelphia. Engineer was thrown off and hurt.

OTHER ACCIDENTS.

BOILER EXPLOSION.

8th, night, engine of freight on Cincinnati, Hamilton & Dayton exploded its boiler while standing in yard in Indianapolis, Ind. The engine was completely destroyed, one of the driving wheels being thrown 200 yards away. The fireman was badly hurt.

26th, night, locomotive of passenger train on Baltimore & Ohio exploded its boiler when near Canton, Md. The engine was completely wrecked, and the train was stopped so suddenly that the forward car was forced upon the tender and the second car into the forward one, damaging both very badly. The force of the explosion was upward and backward, and pieces of the boiler were thrown 100 yards away from the track. The engineer, fireman and a brakeman were very badly injured, and 2 passengers in forward car were slightly hurt. The cause of the explosion was unknown. The engine was nearly new, having been in use only about a month, and was of the Wooten pattern.

CYLINDER EXPLOSION.

17th, a. m., engine of freight on New York, Lake Erie & Western exploded a steam chest when near Union, N. Y. Engineer was badly scalded by escaping steam.

BROKEN PARALLEL-ROD.

3d, night, engine of passenger train on Boston & Maine broke a parallel-rod when near Medford, Mass., damaging the engine considerably.

7th, p. m., engine of passenger train on Northern, of New Jersey, broke a parallel-rod when near Closter, N. J., and was badly damaged.

8th, a. m., engine of passenger train on New York Central & Hudson River broke a parallel-rod when near Oriskany, N. Y., and was badly damaged.

28th, night, engine of passenger train on Chicago & Alton broke a parallel-rod when near Chicago. Engine was badly damaged and engineer injured by escaping steam.

CAR BURNED WHILE RUNNING.

25th, night, sleeping car of passenger train on Intercolonial road caught fire when near Richibucto, N. S., and was destroyed.

SUMMARY.

This is a total of 135 accidents, in which 42 persons were killed and 148 hurt. As compared with September, 1885, there was an increase of 44 accidents, of 17 killed and of 50 injured.

The nine months of the current year to the end of September show a total of 848 accidents, 286 killed and 1,092 hurt; a monthly average of 94 accidents, 32 killed and 121 injured.

A fuller statement of totals and averages, with a summary of the causes of accident, will be found on another page.

Tie-Preserving Works at Laramie.

The tie-preserving plant of the Union Pacific Railway at Laramie, Wyoming Ter., which is illustrated herewith, went into operation July 26, 1886. It consists of the following buildings:

- | | |
|----------------------------------|-------------------------------------|
| 1. Warehouse, 22 x 32. | 10. Tannin mixing tub, 500 gallons. |
| 2. Vat house, 16 x 26 x 10 x 12. | 11. Water tub, 6,000 gallons. |
| 3. Cylinder house, 117 x 26. | 12. Engine house, 9 x 14. |
| 4. Pump house, 54 x 7. | 13. Loading platform, 120 x 9. |
| 5. Boiler house, 22 x 32. | 14. 100 iron tramway cars. |
| 6. Office, 14 x 16. | 15. 1/4 mile of tramway. |
| 7. Chloride tub, 50,000 gallons. | 16. 5 sections of wire rope. |
| 8. Tannin tub, 50,000 gallons. | 17. 7 stationary pulleys. |
| 9. Glue mixing tub, 500 gallons. | 18. 9 guide pulleys. |
| | 19. 2 railway sidings. |

The whole being located on about 15 acres of land, upon which the ties are also stored. The total cost, including the land, may be stated at \$40,000.

The process used is the "zinc tannin" modification of burnetting, in which solutions of glue and tannin are added, to prevent the chloride of zinc from washing out. It is worked as follows, the various supplies being received through and about the warehouse:

Metallic zinc is placed in lead-lined vats in the vat house (two being used to make the solutions and one for storage), and muriatic acid is poured over it. The result is a solution of chloride of zinc which stands at about 40 deg. Beaumé. This is diluted with water, until it stands at about 1.90 deg. Beaumé, and a small percentage of dissolved glue (from tank 9) is added, when it is stored in the chloride solution tub (No. 7).

A similar dilution of the extract of hemlock bark, or tannin, is made in the tannin mixing tub (No. 10) and stored in the tannin solution tub (No. 8).

The ties to be preserved are then loaded upon the tramway cars. There are 100 of these, running over the lines of tramway of 2 ft. gauge, which are so arranged as to reach every portion of the tie yard. The cars are then hauled by the wire rope, by means of the engine (No. 12) into the cylinders. These latter are 111 ft. long and 6 ft. in diameter, and contain each 13 cars, loaded with say 350 to 400 ties, according to size.

The cylinder door is then closed hermetically tight, and the treatment begins.

This consists in steaming the wood to liquefy the sap, working a vacuum in order that the expanded air and steam may drive out as much sap as possible, and then injecting the two solutions successively under pressure. It is generally done upon the following schedule of time:

	Hours.	Minutes.
1. Charging one cylinder.....	0	20
2. Raising steam pressure to 18 lbs.	0	20
3. Duration of steam pressure.....	2	—
4. Blowing off steam.....	0	15
5. Working vacuum.....	1	—
6. Admission of chloride solution.....	0	15
7. Duration of pressure (100 lbs.).....	2	30
8. Forcing back chloride solution.....	—	20
9. Admission of tannin solution.....	—	10
10. Duration of pressure 100 lbs.	1	—
11. Forcing back tannin solution.....	0	20
12. Discharging one cylinder.....	0	20
Total time occupied.....	8	50

It will thus be seen that the treatment occupies about nine hours, the object being to inject the wood as completely as possible with the chloride of zinc, and then to close the outer sap cells with the tannin, which, upon coming into contact with the glue of the first solution forms pellicles of artificial

Operations of Wood-Preserving Works, Laramie, Wyo., from July 26 to Aug. 31, 1886.

DATE.	Run.	CHARGE.		ABSORPTION OF SOLUTION WITHOUT GLUE.			Baumé Reading.	ABSORPTION OF PURE CHLORIDE.		
		No. of hewn ties.	Cubic feet of timber in charge.	Per cent. by volume.	Solution heavier than timber.	Per cent. by weight.		Per cent. of chloride in solution.	Per cent. of chloride in timber by weight.	Total weight of pure chloride absorbed.
July 26	1 2	804	2,976.8	13.68	2.142	29.30	Gross, 2.05 Glue, 0.17 Net, 1.88	1.44	0.42	368.95
" 27	3-4	745	2,623.5	16.24	2.142	34.09	" 1.88	1.44	0.49	379.36
" 30	5-6	692	2,623.5	16.24	2.142	34.09	" 1.88	1.44	0.49	379.36
Aug. 3	7-8	651	2,709.7	18.98	2.141	40.65	" 1.83	1.41	0.57	455.79
" 4	9-10	673	2,882.0	20.08	2.145	43.07	" 2.08	1.60	0.69	586.83
" 5 and 6	11-12	655	2,752.8	21.01	2.141	44.99	" 1.83	1.41	0.63	511.78
" 6	13-14	648	2,838.9	21.13	2.141	45.24	" 1.83	1.41	0.64	536.17
" 6 and 7	15-16	668	2,838.9	21.89	2.139	46.82	" 1.63	1.25	0.59	494.26
" 7 and 8	17-18	656	2,731.2	21.18	2.139	45.31	" 1.63	1.25	0.57	459.41
" 8 and 9	19-20	636	2,623.5	22.88	2.139	48.93	" 1.63	1.25	0.61	472.26
" 9	21-22	614	2,623.5	19.60	2.141	41.97	" 1.78	1.37	0.57	441.29
" 9 and 10	23-24	674	2,731.2	21.18	2.143	45.39	" 1.98	1.52	0.69	556.12
" 10	25-26	674	2,709.7	20.57	2.140	44.01	" 1.73	1.33	0.59	471.78
Totals and range.....	1-26	8,790	35,665.2	13.68 to 22.88	2.139 to 2.145	29.30 to 48.93	1.63 to 2.07	1.25 to 1.60	0.42 to 0.69	6,113.37
" " Aug. 10-18..	27-49	7,625	31,329.2	14.26 to 22.76	2.139 to 2.150	30.51 to 48.72	1.73 to 2.43	1.25 to 1.86	0.41 to 0.85	5,977.45
" " " 18-26..	50-75	8,642	35,807.3	18.48 to 24.34	2.140 to 2.145	39.61 to 52.05	1.73 to 2.08	1.33 to 1.60	0.58 to 0.83	7,250.91
" " " 26-31..	76-93	5,949	24,990.3	18.50 to 24.24	2.141 to 2.145	39.83 to 51.90	1.83 to 2.13	1.41 to 1.63	0.59 to 0.77	5,087.91
Total and general average.....		31,006	127,792.0	20.70	2.142	44.53	Gross, 2.07 Glue, 0.17 Net, 1.90	1.46	0.65	24,429.64

NOTE.—We have reprinted in full but one of the form sheets, giving averages only for the other sheets, as more likely to serve the purpose required.

Elevated Platform 9x126 Ft.

12 Engine House 9x14'

15 Train-Way

17

17

Movable Track.

This is obtained as follows :

Each cylinder is accurately gauged with 13 empty cars in it, and by reading the gauges on the solution tub at the lowest point reached, just before the surplus solution is forced back out of the cylinder, and also after it is all forced back, the displacement of each load is ascertained, and thus the number of cubic feet of ties in the cylinder is known.

The solution tank being also gauged by observing the reading both before and after each run, the total cubic feet of solution absorbed by the charge is also ascertained, and the strength being known it is easy to compute the amount of pure chloride absorbed.

The mountain pine ties, which are chiefly operated upon at Laramie, are found to weigh 29.51 lbs. per cubic foot.

From these various elements the following table is computed, showing the results of the first month's operation :

The chloride of zinc process appears to be gradually supplanting all others in Germany, the tannin modifications being a decided improvement in it. The great essential for success is thoroughness and fidelity in completely charging the ties, so that the process can never be reduced to an ordinary contracting basis in which inspection after the work is done is relied on. Absolute fidelity to good work as a prime condition must be assured.

An Omaha newspaper account of the works says :

"The process is more particularly adapted to the more porous and perishable woods. It hardens them as well as preserves them from decay, so that mountain pine ties, which generally rot on the plains in four or five years, will probably last 12 or more years after having been treated, thus rendering them more durable than the best oak, which goes to decay in the track in seven or eight years. The cost of this treatment is about 20 cents per tie, and the economy may be estimated as follows :

"Unprepared pine ties, such as are now used, cost about 55 cents each laid in the track, and last say four years. The cost thus averages 13 3/4 cents a year. After treatment they will cost 75 cents each, laid in the track, and are expected to last 12 years. The cost will thus average 6 1/4 cents a year per tie, and the estimated saving will be some 7 1/2 cents per annum on each cross tie prepared.

"It will thus be seen that upon a railroad like the Union Pacific, with some 5,000 miles of track, laid with some 13,000,000 of ties, the process seems to promise large economies.

"During the first construction of the road somewhat similar but smaller works were erected at the terminus of the road in Omaha. They used the old 'burnettizing' process, using chloride of zinc without the glue or tannin, and operated upon cottonwood ties. Their capacity proved, however, to be utterly inadequate to treating the ties as fast as they were required for construction, and exasperating delays occurred. It is said that this led to hurried and imperfect treatment, and that not only did the zinc wash out, but that in some cases too strong a solution was used, so that the ties were then preserved against decay but their strength was impaired. They were made so brittle that they broke in the track, and finally the works were abandoned and the plant dismantled.

"The success of 'burnettizing' in Europe, and the results accomplished in working the 'zinc tannin' improvement during the last seven years in St. Louis, warrant the expectation that these works at Laramie will prove thoroughly efficient in prolonging the life of the ties."

The works, as also those at Las Vegas for the Atchison, Topeka & Santa Fe, have been erected under the supervision of Mr. O. Chaute, of Kansas City, Mo., by a company styled the "Chicago Tie-Preserving Co.," which have also this season built works on the grounds of the Rock Island Co. in Chicago, where for some months past it has been treating ties by the same (Wellhouse) process. It has a five-year contract with the Chicago, Rock Island & Pacific. The two cylinders at the works at Chicago have a capacity of 400 ties each, and two charges per day of 24 hours is their usual output. At present they are treating hemlock exclusively, and claim to increase the life of the tie 200 per cent.

Master Mechanics' Association Circulars.

The following circulars have been issued by Secretary J. H. Setchel from his office at Dunkirk, N. Y. :

TWENTIETH ANNUAL CONVENTION.

You are hereby notified that the Supervisory Committee have decided to hold the twentieth annual meeting of the American Railway Master Mechanics' Association at St. Paul, Minn., on the third Tuesday in June, 1887. Details of arrangements will be made known later.

J. H. SETCHEL, Secretary.

WILLIAM WOODCOCK, }
R. H. BRIGGS, }
J. JOHANN, } General Supervisory Committee.
GEO. RICHARDS, }
J. H. SETCHEL. }

CONTROL OF ENGINEERS OVER THE WEAR OF DRIVING WHEEL TIRES.

The undersigned desire answers to the following questions :

1. Has the Locomotive Engineer any control over the wear of Tires ?
2. If so, in what way ?
3. What is your method of determining the wear of Tires ?
4. Do you have Regular Engineers on your locomotives ?
5. Will Tires run longer between turnings with Regular Engineer than with Different Engineers ?
6. Is a free use of Sand desirable or not as regards the wear of Tires ? Give figures if possible, if not the experience of yourself or engineers.

FRED. B. GRIFFITH, }
J. S. GRAHAM, } Committee.
JOHN MACKENZIE, }

All communications should be sent to John Mackenzie,

Superintendent of Motive Power, New York, Chicago & St. Louis Railway, Cleveland, Ohio.

Master Car-Builders' Association.

The Secretary, Mr. M. N. Forney, has issued the following list of subjects, with the committees appointed to report thereon at the annual convention of the Master Car-Builders' Association, to be held in Minneapolis, June 14, 1887 :

1. Standards and Appliances for the Safety of Trains.

In 1884, the committee on this subject was appointed in accordance with the following resolution : "Resolved, That a committee be appointed to prepare a circular calling the attention of railroad managers to the standards and the appliances for the safety of trainsmen, which have been recommended by this association, and that this committee be urged to do everything in its power to secure their adoption." At the convention held in 1885, the committee was discharged, and a resolution was passed to have a new one appointed. This committee was continued in 1886.

H. Hegewisch, United States Rolling Stock Co., No. 35 Wall street, New York.

John Kirby, Lake Shore & Michigan Southern, Cleveland, O.

M. N. Forney, No. 23 Murray street, New York.

2. British and Continental Practice in Matters of Interest to the Master Car-Builders' Association :

R. H. Soule, New York, Lake Erie & Western, Buffalo, N. Y.

Wm. McWood, Grand Trunk, Montreal, Can.

Henry A. Whitney, Intercolonial, Moncton, N. B.

3. Automatic Freight Car Brakes :

Godfrey W. Rhodes, Chicago, Burlington & Quincy, Aurora, Ill.

Geo. Hackney, Atchison, Topeka & Santa Fe, Topeka, Kan.

B. Welch, Central Pacific, Sacramento, Cal.

John S. Lentz, Pennsylvania & New York Canal & Railroad Co., Packerston, Pa.

W. T. Hildrup, Harrisburg Car Co., Harrisburg, Pa.

4. The Comparative Advantages of the Two Methods of Constructing Freight Cars, with and without Platform Timbers or End Sills projecting from the End of the Car :

This committee was continued, its scope enlarged and it was empowered to submit plans giving two standards for the end floor framing of freight cars.

E. B. Wall, Pittsburg, Cincinnati & St. Louis, Columbus, Ohio.

B. K. Verbryck, Chicago, Rock Island & Pacific, Chicago, Ill.

Geo. W. Cushing, Northern Pacific, St. Paul, Minn.

W. H. Harrison, Baltimore & Ohio, Baltimore, Md.

W. F. Turrett, Cleveland, Col. & Ind., Cleveland, O.

5. Maximum Outside Dimensions of Freight Cars :

John P. Levan, Pennsylvania Railroad, Altoona, Pa.

C. A. Smith, Union Tank Line, 267 Fourth street, Jersey City, N. J.

Geo. C. Watrous, Detroit, Lansing & Northern Railroad, Ionia, Mich.

6. Standard Draw-Gear for Non-Automatic Couplers :

S. B. Haupt, Norfolk & Western Railroad, Roanoke, Va.

J. N. Mielham, New York, Lake Erie & Western, 234 Third street, Jersey City, N. J.

Allen Cooke, Chicago & Eastern Illinois, Danville, Ill.

7. Appliances to Prevent the Slipping of Wheels, both Passenger and Freight :

J. W. Marden, Fitchburg Railroad, Boston, Mass.

F. M. Wallis, Philadelphia, Wilmington & Baltimore, Philadelphia, Pa.

W. H. Day, Wilmington, Columbia & Augusta Railroad, Florence, S. C.

8. Standard Freight Car Truck and Axle for Cars of 60,000 lbs. Capacity :

This committee is instructed to suggest means for having the axles made uniform in size.

Joseph Wood, Pennsylvania Company, Fort Wayne, Ind.

H. Roberts, Grand Trunk and Detroit, Grand Haven & Milwaukee, Detroit, Mich.

M. M. Martin, Wabash, St. Louis & Pacific, Decatur, Ill.

Leander Garey, Hartsdale, Westchester Co., N. Y.

R. C. Blackall, Delaware & Hudson Canal Co., Albany, N. Y.

9. Standard Sizes of Lumber for Freight Cars :

Wm. Forsyth, Chicago, Burlington & Quincy Railroad, Aurora, Ill.

Frank J. Hecker, Peninsular Car Works, Detroit, Mich.

W. R. Davenport, Erie Car Works, Erie, Pa.

10. The Best Form and Construction of Car Roofs :

J. D. McIlwain, Grand Trunk Railway (Great Western Division), London, Ont.

Samuel Irwin, Missouri Pacific, Sedalia, Mo.

L. Packard, New York Central & Hudson River, West Albany, N. Y.

11. Subjects to be Reported at the Next Annual Convention for Investigation and Discussion at the Succeeding Convention :

J. W. Marden, Fitchburg Railroad, Boston, Mass.

John W. Cloud, Pennsylvania Railroad, Altoona, Pa.

Thomas A. Bissell, New York Central Sleeping Car Co., Buffalo, N. Y.

12. Committee of Arrangements for the Next Annual Convention :

Geo. W. Cushing, Northern Pacific Railroad, St. Paul, Minn.

Geo. F. Wilson, Minneapolis & St. Louis Railroad, Minneapolis, Minnesota.

New England Roadmasters' Association.

The fourth annual meeting of this Association was held at Manchester, N. H., Oct. 20 and 21. President J. W. Shanks presided, there being 23 members present, representing the following roads: New York, New Haven & Hartford, J. Shanks, Md. E. Cork and L. H. Perkins; Boston & Maine, A. C. Stevens; New York & New England, G. E. Daggett and H. N. Hammond; Central Vermont, A. C. Baile, E. W. Horner and Thomas Devine; Cheshire, R. Hyland and G. H. Follansbee; Connecticut River, J. R. Patch; Concord Railroad, P. A. Eaton; Manchester & Lawrence, H. M. Wood; Vermont Valley, W. E. Clark; Boston & Lowell, M. Clifford;

New London Northern, J. W. Shanks; Portland & Ogdensburg, E. Newcomb; Providence & Worcester, W. F. Ellis; Burlington & Lamoille, J. F. Day; Narragansett Pier, P. D. Brennan; Fitchburg, G. W. Bishop; Boston & Providence, C. S. Slufter.

The total membership is 60, including 4 new members: John Dordy, New Haven & Derby; Charles Leroix, Boston, Revere Beach & Lynn; S. B. Bodwell, Jr., Boston & Lowell; John Mott, Central Vermont. These gentlemen were enrolled as members at this meeting.

On the first day there was a session from 2:30 p. m., until 10:30, except an hour intermission, the questions of road tools, nut locks and split switches being discussed.

On that of road tools there was shown a desire on the part of members present, that in the renewal of such better and labor-saving tools should be procured and used.

For the last 18 months members present had been giving a trial to the various nut locks in use, and a preference was given to the Excelsior, the Verona, and the Vulcanized Fibre.

In the discussion of split switches, the length, throw and dimensions of same were considered, and the practical lead from the point of No. 6 to No. 9 frogs to the heel of a 15 ft. switch with the rule for same was given by some of the members present.

SECOND DAY.

On the second day there was a session from 9:30 a. m. to 9 p. m., with proper intermissions, and in the further discussion of Split Switches it was

"Resolved, That for economy of labor and material of the Road Department the split switch with the automatic stand is the best for use on switches at side tracks as well as on the main track, and the Association would recommend that all renewals should be made with the split switch and automatic stand.

"Resolved, That the flexible switch or the oval should be used in preference to the rigid oval in all Split Switches."

A long debate was held on the question of Elevation of Curves, showing a great difference of opinion as regards the same; members present having trains running at a speed of 30 miles and under favoring 1/2 in. per degree, while those having trains with a speed of over 30 miles to 60 per hour favored 3/4 in. to 1 in. per degree, a majority desiring an elevation not exceeding 4 1/2 in., trains being slowed up at sharp curves requiring more elevation, on account of the expense in the care of the curves through the slow speed of the freight trains where excessive elevation is used. The opinions expressed were that, for the smooth riding of the curves, with the uniform elevation of same and the proper increasing elevation at the approaches to same, there should be more care paid to their alignment and the use of the level-board by our trackmen; that with the increased weight and increased length of rigid wheel-base of engine in use, curves above 4 degrees should have gauge widened.

In the discussion of railroad ties, though there was a feeling that the length of ties should be increased above 8 ft., yet if 7-in. thick ties with 7 in. face and above could be obtained, it would please the majority of those present. Interesting facts as regards the preservation of ties were presented by members, there being on exhibition a piece of a hemlock tie that had been kyanized, which had been in use on the Boston & Maine road for five years, and seemed to be in such condition as to be good for at least five years more life for railroad purposes. Samples of oak and pine ties from the New York, New Haven & Hartford road which had been preserved, process not known, in use for four years, showed very little wear. A birch tie that had been Burnetized and had been in use on the Central Vermont road for 35 years, was shown, and in good condition; also a piece of a red cedar tie, not preserved, cut from a tie now in use and for the last 37 years in the track of the Central Vermont, was shown. From these facts, and the realization of the rapid removal of the forests for ties, it was desired that those members who could experiment with the use of preserved ties and procure facts as regards same should present at the next meeting such facts, especially of the use of cheaper woods.

Then followed the discussions on economy of Labor and Material in Maintenance of Track; Recommendations as regards Frogs by the Superintendents' Association; Foot Guards; Guard Rails on Bridges and Bridge Floors, and finally, review of previous years' discussion of Joints, Rails, etc.

Representatives of the Tracy Switch Co., the Weir Frog Co., the Jersey City Iron Works, the Vulcanized Fibre Co., the Ramapo Iron Works, the Sheffield Velocipede Co., the Bush Interlocking Bolt & Nut Co., Crerar, Adams & Co., Pettibone, Milliken & Co., Ruffner, Dun & Co., Andrew Warner, Metcalf, Paul & Co., the Carlisle Manufacturing Co., and others were present with exhibits of their industries.

The following officers for the ensuing year were elected: President, A. C. Stevens, Boston & Maine; Vice-President, J. S. Lane, New York, New Haven & Hartford; Chaplain, E. W. Homer, Central Vermont; Secretary, W. F. Ellis, Providence & Worcester; Treasurer, J. R. Patch, Connecticut River; Executive Committee, P. A. Eaton, Concord, L. H. Perkins, New York, New Haven & Hartford, and G. W. Bishop, Fitchburg.

After resolutions of thanks to officers, railroad officials, etc., the convention adjourned, to meet at Hartford, Conn., on the third Wednesday in October, 1887. A printed report of the proceedings will be issued by the Association in January.

The Town of Pullman.

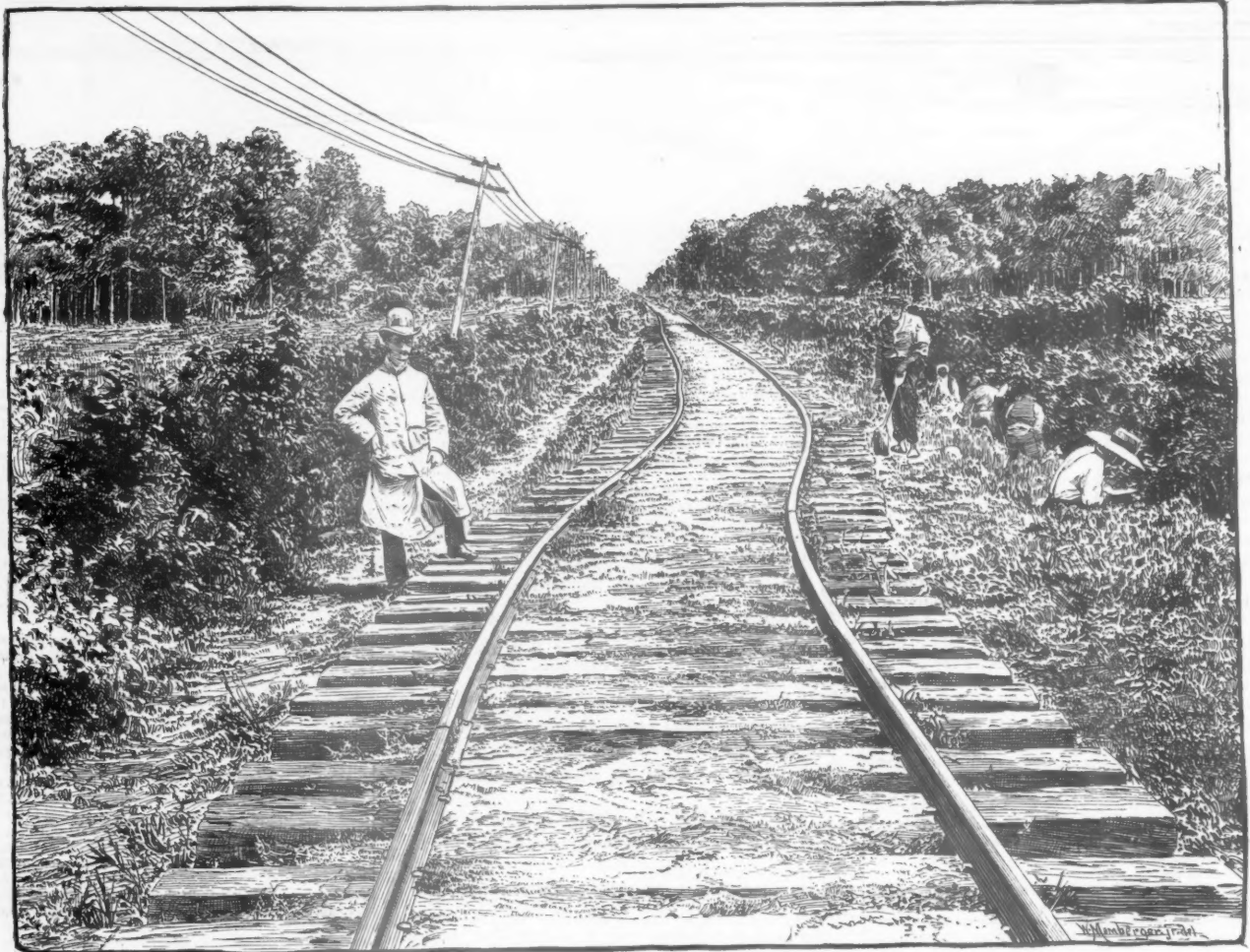
At the annual meeting of Pullman's Palace Car Co. in Chicago, Oct. 14, President Pullman made the following statements in relation to the company's town of Pullman :

All the conditions at Pullman continue satisfactory. The population is now 9,013 as compared with the census of July 28, 1885, which showed 8,603.

There are 40,000 people residing within a radius of 3 1/2 miles of the Pullman Arcade, 13,500 being within one mile of that structure.

The number of pupils enrolled at the public schools during the year was 1,185 as against 953 during the previous year. The average rental for operatives continues low, and compares most favorably with other manufacturing towns.

In other suburbs of Chicago, the rental for equal space is no lower than at Pullman, while the advantages and conven-



EARTHQUAKES AND TANGENTS.

View near Ten-Mile Hill on the South Carolina Railroad after the earthquake of Aug. 31.

iences in the latter place are in every respect greatly superior.

Among the advantages—the importance of which can hardly be overestimated—is the perfect system of drainage and sewerage connected with every structure in the town. The value of this system is clearly indicated by the continued extremely low death-rate, namely, 7.87 in every 1,000 inhabitants for the year ending Oct. 1, 1886.

I may here mention that, during the past month, eminent engineers from Aix-la-Chapelle, Berlin, the City of Mexico, Denver, and from Chicago, have visited the town, and have studied its sanitary and other conditions exhaustively, and have warmly acknowledged its great suggestive value to them.

In addition to the healthful and attractive homes with their pleasant surroundings, including churches, libraries, reading-rooms, etc., the Masons, Odd Fellows, Knights of Pythias, Foresters, and other organizations for social and insurance purposes, have large and flourishing lodges. The Pullman Athletic Club has become quite a prominent factor in the sports of the place.

As a natural and legitimate result of the advantages in connection with the hygiene and recreation enjoyed by operatives, coupled with the absence of deleterious influences, it is gratifying to note evidences of the financial prosperity, such as the following statement from the Pullman Loan and Savings Bank, showing the savings deposits:

Date.	No. Acc'ts.	Bal. Dep.	Av. per Acc't.
Aug. 1, 1884.....	578	\$83,943	\$145.23
Oct. 1, 1885.....	652	108,300	165.95
Oct. 1, 1886.....	724	144,922	200.16

The high reputation of the people of Pullman for industry, sobriety and intelligence is very generally recognized.

In the several industries, namely, Pullman Car Works, Town of Pullman, Union Foundry, Pullman Iron and Steel Co., Allen Paper Wheel Co., and Calumet Manufacturing Co., the total payments to operatives during the fiscal year were \$2,110,985, and the average number employed was 3,597; the average earnings of each operative being \$586.85 per year of 310 days, as against \$576.60 for the previous year.

In connection with the fact that the average earnings of operatives show a slight increase over the previous year, it is gratifying to be able to state that the cost of living has decreased; the price of groceries, provisions and general supplies being considerably lower than they were a year ago, owing, in part, to the vigorous competition for the valuable trade of Pullman.

This, in a measure, also accounts for the increase in the savings bank deposits.

It is believed that the average earnings per annum of operatives are not exceeded, if equalled, in any other place where similar work is carried on.

Lands immediately adjoining Pullman will soon be put upon the market at very reasonable rates, to enable workmen and others to secure permanent homes of their own.

The site selected for this purpose is 15 ft. above the level of Lake Calumet; the soil being blue clay, the best possible foundation for houses. The tract is nowhere more than half a mile from a depot and an unequalled train service.

The Catholics have already purchased land on this site and are building an elegant and substantial church edifice.

Earthquakes and Tangents.

Never before in this country has there been, and it is to be hoped never again will there be, opportunity to present such a picture of the effect of "the bottom dropping out of every thing" as that which we present in this issue in our engraving (an exact reproduction of a photograph) of what

was left of what had before been a tangent on the South Carolina Railway, near the point where a bad accident and worse scare occurred on the night of the earthquake of Aug. 31, and where (we presume) the dislocation was exceptionally severe. It hardly seems possible that the sharp curve in the foreground can be wholly due to a permanent dislocation of the surface, but we are informed that it was, as also the quick drop in grade in the "middle distance." The photograph gives obscure evidence of still further dislocations in the background, which has been rather softened than obscured in the engraving.

The Charleston & Savannah road is said to have suffered on the whole even more severely than the South Carolina or the Northeastern as respects dislocation, although all the serious wrecks occurred on the other lines. Accounts of three of those wrecks, including the one near the point illustrated, were given in our issue of Sept. 10, as also a description of the accompanying "quakes." In connection with this engraving the nature of the catastrophe, and the fact that the description is probably not exaggerated, can be better appreciated, and we therefore reproduce the substance of it:

"Near Ten-Mile Hill a fatal accident occurred on Tuesday night. The down Columbia train (South Carolina Railroad) jumped the track under the unseen influence of the shock that dismantled the road. It is said that the earth suddenly gave way and that the engine first plunged down the temporary declivity. It was then raised on the top of the succeeding terrestrial undulation, and having reached the top of the wave a sudden swerving of the force to the right and left hurled the ill-fated train down the embankment.

How it was done was plainly indicated. In many places along the track of the South Carolina and the Northeastern Railroads, and for spaces of several hundred yards in width, the dreadful energy of the earthquake was expended in two particular ways. First, there were intervals of a hundred yards and more in which the track had the appearance of having been alternately raised and depressed, like a line of waves frozen in their last position. The second indication was where the force had oscillated from east to west, bending the rails in reverse curves, most of them taking the shape of a single, and others of a double letter S placed longitudinally. These latter accidents occurred almost invariably at trestles and culverts. There were no less than five of them between the Seven-Mile Junction and Jedburg. In other places the track had the appearance of being kinked for miles, but always in these cases in the direction of the rails.

The train at the time of the earthquake was running along at the usual speed, and when about a mile south of Jedburg it encountered a terrible experience. It was freighted with hundreds of pleasure-seekers returning from the mountains. They were all gay and happy, laughing and talking, when all of a sudden, in the language of one of them, the train appeared to have left the track and was going up, up, up into the air. This was the rising wave. Suddenly it descended, and as it rapidly fell it was flung first violently over to the east, the side of the car apparently leaning over at less than an angle of 45 degrees. Then there was a reflex action, and the train righted and was hurled, with a roar as of a charge of artillery, over to the west, and finally subsided on the track and took a plunge downward, evidently the descending wave. The engineer put down the brakes tight, but so great was the original and added momentum that the train kept right ahead. It is said on trustworthy authority that the train actually galloped along the track, the front and rear trucks of the coaches rising and falling alternately. The utmost confusion prevailed,

women and children shrieked with dismay, and the bravest hearts quailed in momentary expectation of a more terrible catastrophe. The train was then taken back in the direction of Jedburg; and on the way back the work of the earthquake was terribly plain. The train had actually passed over one of those serpentine curves already described."

Two other accidents of the same general nature were likewise described in the same issue. The only pleasant feature in these occurrences, to a railroad man, is that at least it can be said of them, with literal and indisputable truth, that "no one was to blame."

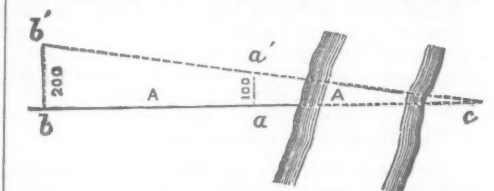
Contributions.

Tracklaying and Triangulating.

CHEYENNE, Wyo., Oct. 19, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There are a few kinks which I have stumbled on and which I believe it would be worth while to give to the world. The first one is in tracklaying: On many of our Western roads rails are laid with even joints except on curves. Here it is the custom to cut a rail at the beginning of the curve into two pieces of such unequal length that by putting the



longer piece on the outside the rails will come out even at the end of the curve. The working out of this by the formula:

$$D = 2g \pi \frac{\text{degrees in curve}}{360}$$

takes some time. In the formula D = difference in length of rails and g = gauge of track. One person gave $2g$ as 10 ft., another gave it as 9.71 ft. Neither of these will give the resulting correct length. In practice, 9.42 ft. will give it. But if you will take total number of degrees in the curve and multiply it by 0.082 ft., or, more simply, by one inch, your rails will come out all right. Prove it by using any degree as the numerator in the above fraction.

Another kink is a method of carrying distances across a river.

A point is established as near as practicable to the river bank at a , where the width of the river is estimated to be, say, 350 ft., and a right angle turned, and a' is established 100 ft. distant from a . At b , 400 ft., or any other distance back from a , the operation is repeated and b' established 200 ft. from b . It is evident that these lines produced will intersect at c , making distance $a-c$ = distance $a-b$. Now you have them for what they are worth.

ASSISTANT ENGINEER.

[Before putting the first "kink" in practice, it might be well to consider whether the thing is worth doing,

after it is done, by reflecting on the problem: If the broken joints are an advantage on the curves, why are they not an advantage likewise on the tangents?

An excellent way for quick triangulation, where greater accuracy than ordinary chaining is not important, is to set up at *a* and turn off an angle of 1 degree toward *c*. The offset at *c*, measured carefully with a 2 ft rule and multiplied by 57.30 (57.29 = cot. 1°) gives the distance. One foot of distance corresponds, therefore, to nearly $\frac{1}{4}$ in. of offset, making it easy to determine the distance within a few inches of possible error, without any additional settings up whatever. For construction this would not answer, but for location it is near enough.—EDITOR RAILROAD GAZETTE.]

Forced Circulation in Locomotive Boilers.

No. 9 PLYMPTON STREET, CAMBRIDGE, MASS.,
Oct. 25, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The defective circulation of water is the most serious menace to the safety of locomotive boilers, and is the primary cause of broken stay-bolts, and of the extra strains by means of which the sheets in the waist of the boiler, toward the smoke-box end, are made the parts where many of the explosive ruptures occur.

In view of well-known cases of steam being found below the water level, no one, perhaps, would deny that in the narrow water spaces around the fire-box and around the closely-packed tubes the water is at times held away from the metal by the accumulation of steam. As long as the water was not in complete contact with the inner fire-box sheets or with the tubes they would become heated to a greater degree than the other parts of the boiler, and a correspondingly greater expansion would take place.

In the fire-box, this expansion and the subsequent contraction when the water again comes in contact with and cools the sheets cause repeated slight bendings to the stay-bolts, whereby they are cracked next to the outer sheet.

More than nine-tenths of the stay-bolts that break are found cracked next to the outside sheet, and it has been found that the best means of detecting broken stay-bolts is to drill them from the outside with $\frac{1}{8}$ in. hole, 1 in. deep.

In exploded locomotive boilers the rupture is often found to have occurred in the plates next to the smoke-box end, beyond the reach of the fire and where the boiler should, if anything, be strongest. It seems, therefore, evident that there must be some important deteriorating agency at work to make these plates the first to give way.

Since it is a well-grounded opinion that the strain of the hydrostatic test is injurious to boilers, how much more so must be the thrust strain brought upon these plates by the extra expansion of even a small number of tubes, especially as this strain is liable to occur at oft-repeated intervals. A single tube will not bend or buckle under an end strain of less than 4,000 pounds, and when arranged as in a locomotive boiler the resistance of each individual tube to buckling increases. Hence it seems possible that if not more than ten or a dozen of the lower tubes should become uncovered by water, which undoubtedly often happens, their expansion would bring a very great extra strain on the 20 or 30 square inches of metal in the bottom portion of the ring next to the smoke box. This strain, acting at right angles to the strain of internal pressure, may be, perhaps, the most powerful influence tending to weaken these plates.

Leaks around tubes and the bulging of the tube-sheets are probably caused, in a great measure, by the expansion of overheated tubes.

It is obvious that the heat which passes through tubes not in contact with the water is, to a greater or less extent, lost, and the comparatively small evaporative effect of fuel in locomotive boilers may be chiefly attributable to this cause.

Metal tubes and plates, thicker than any used in boiler construction, cannot be heated much, if any, above the temperature of the water with which they are in contact. Hence it is evident that there could not be any hurtful difference in expansion between the inner and outer sheets of the fire-box or between the tubes and shell of the boiler if all the parts exposed to the heat were always in contact with the water.

The limited dimensions to which locomotive boilers must be confined compel the use of a great number of small tubes in order to condense the necessary heating surface into the available space. These closely packed tubes and the deep and narrow water spaces around the fire-box so restrict the passages of the steam and water that priming must result, and all of the heating surfaces cannot possibly be always kept in complete contact with the water.

A remedy for the aforesaid evils can, probably, only be found in giving a positive circulation to the water by means of extraneous force. To accomplish this the forward water leg of the fire-box should be extended, by means of a front plate around the rear ends of the tubes, up to the water line over the crown sheet, and thereby separate the water around the fire-box from the water in the shell. The water line in the shell should be only high enough to keep the tubes properly covered, and may, therefore, be several inches lower than that over the crown sheet, thereby affording a larger evaporative surface and more steam room and correspondingly lessening priming. The glass and cocks for indicating the water level must communicate with the water in the shell and not with that surrounding the fire-box. A steam pump, of any kind suitable for hot water, should be arranged to draw water from the lower part of the shell and discharge it into the water legs of the fire-box.

It may, perhaps, be best to have the discharge pipes in the

water legs below the level of the top of the fire and to have these pipes so perforated as to discharge the water pumped from the shell at numerous places within the legs.

The pump should be started as soon as there is steam enough to work it, and should not be allowed to stop so long as there is a fire on the grate; so that a constant current must be maintained from the shell around the fire-box and over the top of the front plate of the forward water leg back to the shell. It is the opinion of some authorities that steam accumulates below the water line when the engine is at rest as well as when the fire is being strongly urged.

By means of pans or partitions, made of thin sheet metal, the tubes may be divided into several separate sets; each set with its independent evaporative surface, and overflowing into the set next below it.

The lowest set of tubes would have the lower part of the boiler shell for its water holder, into which the feed water would be injected.

From this part also the circulating pump would draw its water, and with this part the glass water gauge and the try-cocks would communicate.

By means of the above-mentioned appliances both the evaporative surface and the steam room may be enlarged, threefold without lessening the heating surface.

The evaporative surface may be increased to a much greater extent by decreasing, more or less, the heating surface; though, perhaps, such decrease of heating surface would be more than compensated for by the increased efficiency of the rest. By arranging the tubes in horizontal rows and with a loss of less than one-third of the heating surface each row of tubes may be provided with an independent evaporative surface.

Overheating and priming, if not entirely prevented, would be rendered practically harmless.

Obviously the power requisite to maintain a forced circulation of water in a locomotive boiler is insignificant, and it is submitted that such a circulation would tend greatly to remedy the various deteriorating agencies, so that, with proper periodical inspections, the boiler may be maintained safe, with the fewest repairs, under the highest pressures which it is the present tendency to employ.

There are no patents to interfere with any one who should feel inclined to act on any suggestions made. If the results should be as beneficial as I think they will be, I should be repaid by the credit of being the first, so far as I know, to propose a forced circulation in a locomotive boiler and means for carrying it into effect.

G. B. MAYNADIER.

An Extraordinary Surveying Party.

[A Paper by Augustine W. Wright, before the Western Society of Engineers.]

I was asked the question, "What is the best number to constitute a party upon a railroad survey?" In order to elicit discussion and get the views of our members, I would say that a party who surveyed 24 miles in one day of the Union Pacific Railway, Eastern Division (now Kansas Pacific Division of the Union Pacific) was composed as follows:

1st. Engineer, who was mounted on horseback, and proceeded in advance of the party, accompanied by a man with a shovel, who threw up little mounds of sod to indicate the line.

2d. Front flagman, mounted on horseback, who kept in advance of the transit party, going from mound to mound and putting in a stake upon which he gave the transitman a fore-sight.

3d. Two front chainmen, who relieved each other at intervals of one mile, the one who was not dragging the chain riding in a wagon carrying stakes.

4th. Rear chainman.

5th. Axman to drive stakes.

6th. Man to number stake.

7th. Transitman with wagon to move quickly from point to point.

8th. Topographer.

The level party consisted of two levelers and two rodmen, accompanied by a wagon to move them forward quickly. The line of levels, for instance, started from a bench-mark. The wagon in the mean time had gone forward, containing the other leveler and his rodman. The latter was dropped one mile from the starting-point and the leveler taken 500 ft. or more ahead. The rodman drove a peg in front of the mile stake, and had his rod ready on it by the time that the level was set up. The wagon then retraced its course about 1,000 ft., and awaited the arrival of the first level party. So soon as the last rodman had reached and held his rod upon the peg put in by the other rodman, this party proceeded ahead one mile, and so on.

These 24 miles were surveyed Sunday, Aug. 4, 1887, and this was the "biggest" day's work upon the survey to the Pacific. We frequently surveyed 16 miles with one set of men, but leveler, rodman, two flagmen and transitman were provided with saddle animals. The country was prairie and utterly destitute of timber, and comparatively level.

THE SCRAP HEAP.

Railroad Young Men's Christian Association.

The *Monthly Reporter*, issued by the New York Association, gives the following items:

"In addition to the lectures and practical talks announced in the September number of the *Reporter*, we are very glad to say that Mr. Walter Katte, the new Chief Engineer of the New York Central & Hudson River Railroad, has consented to give us a practical talk on some phase of the work under his supervision.

"Our members will be delighted with the talk of Mr. J. J. Wilson, who is to speak at the Grand Central on Thursday, Nov. 11, on 'An Evening in Germany and Switzerland.' Mr. Wilson's lecture will be illustrated by views thrown on the canvas by one of the finest oxy-hydrogen lights we have ever seen. Mr. Wilson knows how to make such a talk very interesting. We bespeak for him a crowded house.

"Work on the new building has been begun and is being pushed with vigor by Mr. James B. Smith, the contractor to whom was awarded the mason work. The bids for carpenter work were awarded to Messrs. William H. Kirk & Co., of Newark, N. J. The fact that such men have the contracts is in itself a sufficient guarantee of the good quality of work which is expected.

"The report of the Committee for Visitation of Sick and Injured shows for September: Number reported sick, 17; number of callers, 15; number of calls, 30. On the evening of Monday, Oct. 25, a reception and enter-

tainment was given at Association Hall (Fourth avenue and Twenty-third street) to the members of the annual convention of the Brotherhood of Locomotive Engineers. This was a largely attended and very successful affair.

A Troublesome Passenger.

An Indianapolis dispatch of Oct. 22 says: "A crazy negro boarded the early morning express from Chicago, on the Pan Handle road at Logansport to-day, and took a seat in the smoker. When the conductor demanded his fare, the negro sprang to his feet with a whoop, and with a knife and heavy cane cleared the car, not only of passengers, but of the train employes, and kept possession of it until it arrived in this city. At Noblesville the Sheriff of Hamilton County tried to arrest the maniac, but the latter made a dash at him with his knife and refused to be cowed by a cocked revolver. Fortunately the employes had locked the doors of the smoker, and the crazy man was held a prisoner until the arrival of the train here, when, by a little strategy, several policemen were enabled to approach from the rear and disarm him. This was not done, however, until after a tremendous struggle. The lunatic's name is Moses Cannon. He had been in Wabash seeking money, the location of which had come to him in a vision. He was crazed by religious excitement, and all the time he struggled with the officers he prayed for strength to enable him to retain possession of his knife."

Fast Time in Russia.

The capacity of the iron horse for covering space has just been successfully tested, the occasion being an incident in connection with the visit of Prince William of Prussia to the Czar during the recent manoeuvres in Poland. The day before the arrival of the Prince, about four o'clock in the afternoon, Czar Alexander, who had already arrived at Brest-Litovsk, ordered his valet to get his Prussian uniform ready for the next day. "But, your majesty," the valet replied, tremblingly, "we have no Prussian uniform here; your majesty ordered me to leave it behind at St. Petersburg." "Most vexing misunderstanding," the emperor exclaimed, and called the aide-de-camp on duty. "My Prussian uniform must be here at 7 to-morrow morning," was the peremptory order of the Czar. The adjutant bowed and retired. Two minutes later he sent a telegram to the imperial wardrobe office at St. Petersburg, and another to the Warsaw Railway. At 6 o'clock in the evening a locomotive was ready to start from St. Petersburg. An imperial courier with the trunk containing the uniform mounted the engine, and the race against time began. Relay locomotives were held in readiness at Dunaburg and Wilna, to take up the courier, and continue the run, as no single engine could have made a continuous run of such a length. The iron horses accomplished the task assigned to them, and to use a sporting phrase, "came up smiling," or rather puffing. At 7 o'clock in the morning the uniform was at Brest-Litovsk. The courier had performed 589 miles in 13 hours, or 45 $\frac{1}{2}$ miles an hour, without a rest. At 8 o'clock Prince William arrived at Brest-Litovsk, and the Czar received him in his Prussian uniform. We do not envy the courier his ride on the foot-plate; but his orders were imperative, and an autocrat is not to be trifled with.—Iron.

A Boy Train Wrecker.

A dispatch from Greenville, Tex., Oct. 24, says: "A Brooklyn man was killed here yesterday. When the construction train, which is engaged in laying track on the Missouri Pacific from here to Dallas, was coming in from work, it ran over some spikes and bolts which had maliciously been placed on the track. The car next the tender left the track. Three men were on the car, all of whom leaped, but as the car was in a cut, James J. Bartlett, sub-contractor, was caught by a wheel, which completely severed one arm and leg, and horribly mangled his body. The wounded man was dead by the time the train was stopped. Spurgeon McCreary, a boy of 15, was arrested to-day for wrecking the train. He had a spite against the sub-contractor, and had threatened to throw the train. He was seen to place obstructions on the track on previous occasions. Bartlett was 22 years old, and came from Brooklyn, N. Y., a few months ago. He was well educated and had many friends."

A Bold Train Robbery.

A St. Louis dispatch of Oct. 26 says: "The Adams Express car attached to passenger train No. 3 on the St. Louis & San Francisco road, which left this city at 8:25 last night, was robbed of over \$50,000 in cash between here and Pacific Mo. Before the train left this city a man giving the name of Cummings presented to the express messenger, Mr. Fotheringham, a cleverly forged letter bearing a perfect fac-simile of the signature of Mr. Barrett, the local agent of the express company at St. Louis. The letter stated that Mr. Barrett had decided to put an extra man on the route, that the bearer was he, and that Mr. Fotheringham was directed to teach him the details of the business. The stranger was allowed to enter the car, and took great interest in all of the movements of the messenger, apparently desiring to learn quickly the us and outs of the duties which the letter stated he was expected to perform. Mr. Fotheringham's suspicions were not at all aroused and the stranger impressed him as a quiet and prepossessing companion. The two men busied themselves with the accounts, etc., and all went well until a point between St. Louis and Pacific, Mo., was reached.

"In the meantime the new assistant was informed that there was nothing more that he could do at that time, and he seated himself in a chair waiting until some new duties should be assigned to him to perform. Fotheringham was still busily engaged over his accounts with his back turned to Cummings. In the course of time it became necessary for him to go to the safe, and turning to do so, saw the stranger calmly sitting in his chair with a cocked revolver leveled at his (Fotheringham's) head. Cummings cautiously approached the dumbfounded messenger and told him that if he remained quiet and made no outcry or raised no alarm his life would not be endangered; but that if he acted otherwise he could not answer for the consequences.

"Fotheringham had nothing to do but submit. According to his statement, the robber bound him hand and foot, pressed a gag into his mouth, tied him to the safe so that he could not move, and proceeded with his work. The safe had been left open, and it took but a few minutes for the robber to secure the bank notes and valuables in the shape of jewelry, etc. He cut open the bags containing the silver coin, but he evidently concluded that these were too heavy for him to carry, and did not disturb their contents. Of the gold, however, he took a goodly amount and then proceeded to make good his escape.

"The road at this point runs directly alongside of a high bluff, which in places overhangs the tracks, making the danger of wrecks from collision with bowlders, which occasionally fall from above upon the tracks, very great. Trains, therefore, run slowly until the dangerous place is passed. This the engineer of train No. 3 did, as usual, and thus offered the robber an easy means of escape. He first locked all but one door, stepped out on to the platform, locked the door from the outside, and jumped off.

"The messenger, Fotheringham, in the meantime could do nothing to release himself, not being able even to call for help.

"The robber is imperfectly described as a tall dark man of prepossessing appearance, dressed in black, with very large

TABLE I.

Burlington Brake Tests.

WEIGHTS OF TRAIN IN EACH TEST AND PROPORTION BRAKED AND UNBRAKED.

Westinghouse train; Average Weight of Empty Cars, 12,042 tons.

Brake pressure equalized by dead lever so as to be uniform on all wheels. Chicago, Burlington & Quincy cars.

KIND OF TRAIN.			TOTAL WEIGHT.			BRAKED WEIGHT.			Per cent. brake l.
No. cars.	Load.	No. cars braked.	Engine and tender.	Cars.	Total.	Engine and tender.	Cars.	Total.	
Dyn.		None.	68.11	17.25	85.36	38.89	.....	38.89	45.56
25	Mixed.	24 1/2	68.11	571.35	639.46	38.89	295.03	333.92	52.22
25	"	12 1/2	68.11	571.10	639.21	38.89	150.53	189.42	29.61
50	Empty.	49 1/2	68.11	632.15	700.26	38.89	596.08	634.97	90.68
49	"	48 1/2	68.11	620.10	688.21	38.89	584.04	622.93	90.52
49	"	28 1/2	68.11	620.10	688.21	38.89	343.20	382.09	55.51
50	Mixed.	49 1/2	68.11	1132.15	1200.26	38.89	596.08	634.97	52.91
49	"	48 1/2	68.11	1100.10	1168.21	38.89	584.04	622.93	51.32
48	"	47 1/2	68.11	1068.05	1136.16	38.89	572.00	610.89	53.77
50	Loaded.	49 1/2	68.11	1612.15	1680.26	38.89	596.08	634.97	37.79
49	"	48 1/2	68.11	1580.10	1648.21	38.89	584.04	622.93	37.80

Eames train; Average Weight of Empty Cars, 10,460 tons.

Brake pressure not equalized by a dead lever, so that one axle of each truck had only 78.72 per cent. of the pressure on the other axle, making the average efficiency of the power brake 59.36 per cent. of what it would have been with equalized brake pressure of the same maximum pressure. Braked weight per car taken accordingly at 10,460 \times .8936 = 9,347 tons per car. Indianapolis, Decatur & Springfield cars.

Dyn.		None.	68.42	17.25	85.67	38.75	.....	38.75	45.23
25	Mixed.	24 1/2	68.42	571.38	639.80	38.75	229.00	267.75	41.85
25	"	12 1/2	68.42	531.55	599.97	38.75	116.84	155.59	25.75
50	Empty.	49 1/2	68.42	553.05	621.47	38.75	275.74	314.49	50.60
49	"	48 1/2	68.42	553.05	621.47	38.75	462.98	501.73	80.73
49	" (4 lbs.)	48 1/2	68.42	622.59	691.01	38.75	453.34	492.09	71.21
48	Mixed.	47 1/2	68.42	1012.13	1080.55	38.75	444.00	482.75	44.68
49	Loaded.	48 1/2	68.42	1502.59	1571.01	38.75	453.34	492.09	31.36
48	"	47 1/2	68.42	1472.13	1540.55	38.75	444.00	482.75	31.34

American train; Average Weight of Empty Cars, 13,790 tons.

Brake pressure not equalized, reducing pressure on one brake-beam to 73.76 per cent. of that on the other, making the average efficiency 86.88 per cent. of what it otherwise would have been. Braked weight per car taken at 13,790 \times .8688 = 11,985 tons per car. St. Louis & San Francisco cars.

Dyn.		None.	66.77	17.25	84.02	37.37	.....	37.37	44.48
25	Mixed.	24 1/2	66.77	614.80	681.57	37.37	293.51	330.88	48.55
American train after Readjusting Brake Leverage; 91.36 per cent., or 12,603 tons per car braked.									
25	Mixed.	24 1/2	66.77	614.80	681.57	37.37	149.75	187.12	27.45
50	Empty.	49 1/2	66.77	719.55	786.32	37.37	551.08	588.45	74.84
48	"	27 1/2	66.77	691.97	758.74	37.37	329.45	366.82	48.35
41	"	40 1/2	66.77	594.44	661.21	37.37	485.19	522.56	78.91

Widdfield & Button train; Average Weight of Empty Cars, 10,477 tons. Brake pressure equal on all wheels.

25	Mixed.	24 1/2	68.42	571.34	639.76	38.75	256.68	295.43	46.18
24	"	23 1/2	68.42	540.38	608.80	38.75	243.30	282.05	46.77
25	"	12 1/2	68.42	531.97	600.39	38.75	130.96	169.71	28.27
50	Empty.	49 1/2	68.11	553.89	622.00	38.80	309.07	347.96	55.94

Roze train; Average Weight of Empty Cars, 12.05 tons. 86.28 per cent. average effective pressure, there being no dead lever. 10,397 tons braked.

25	Mixed.	24 1/2	68.11	571.28	639.39	38.89	254.72	293.61	45.92
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hands and feet. It is a singular coincidence that he gave the name of Jim Cummings, the only member of the once celebrated James gang who has never been accounted for."

Official Record of Stops, Burlington Brake Tests.

We present in the accompanying tables the official and first correct record of the initial speeds and distance run in the late Burlington brake tests. The time in seconds of the stop is a detail of minor importance, practically and theoretically, and this record is substantially the same as we have been published heretofore. The distance run was measured in with a tape on the ground from stakes 50 ft. apart, and this also is in the main the same as heretofore published, but with some few important corrections of errors which will creep in reading from a tape, most of which were large ones, as of 50 or more feet. These were detected when the dynamometer diagrams came to be compared with the tape measure.

The initial speeds, however, are almost every one of them different from the rude approximations heretofore published, most of them being from 1 to 2 or 3 miles per hour higher or lower than the former figures. When the speed given for one brake chances to be a mile or two too high, and for another a mile or two too low, as happened in numerous instances, it will be seen how deceptive such records might be, and for this reason we have refrained from giving any formal tabular summary of the imperfect records, being unwilling to disseminate and give authenticity to misleading information.

The records of the No. 3 and No. 4 stops have only this week become available. Therefore we publish the official records of speed and distance for all the four classes of stops together, and postpone publication of the computed efficiency until that also can be presented for all four stops together, which it has not been possible to do in the time available.

In a second table we give the weights of each different train tested, showing the total weight and the weight of empty cars on braked wheels only. As a good many casualties happened to the cars, many of the nominal 50 car-trains consisted only of 49, 48 or even 41 cars. In one or two instances, moreover, as in one of the Eames 50-car runs, some of the cars which should have been empty were loaded, because there was not time to unload them. In a number of other instances the brakes on various trucks and cars were cut out.

These and other causes, such as the variation in weight of the empty cars while the load in them was (in most of the tests) constant at 40,000 lbs., made the proportion of load on braked and unbraked wheels quite variable, as will be seen in the table. The only true test of comparative efficiency, therefore, is the ratio of the retarding force of the brakes to the load on the braked wheels, which latter, of course, must be

taken as merely the weight of empty car resting of the wheels, since it is not possible to adjust the brakes to utilize the weight of the load for braking power without danger of sliding the wheels when the cars are empty.

As three out of the five trains came to the tests with their "foundation brake" rigged without a dead-lever, reducing the pressure on one axle to about three-fourths only of what it was on the other axle (which latter, of course, limited the brake pressure), it was concluded by the Committee that, while this was a defect for which the competitors as such were entitled to no credit nor allowance, because it was due wholly to their own carelessness or ignorance, yet, as the purpose which the Committee had in view in making the tests was simply to get a fair idea of the comparative efficiency of the power brake-gear proper, it would be better, and give a much more correct idea of the comparative workings of the power brake, to deduct the weight which was in effect thrown away by carelessness, from that to which brakes were nominally applied, in computing efficiency.

The question stood precisely on the same footing as it would if, through negligence or ignorance of certain competitors that oil would destroy the grip of the brake-shoes (if we can imagine such a case), about one wheel in eight had been not simply greasy in the beginning, but continuously lubricated with oil. The loss by neglecting to use a dead-lever was almost exactly the same, and had no more and no less to do with the efficiency of the brake-gear proper than would such lubrication, and it placed those brake companies who were guilty of coming to the test with unequal brake-pressure under an equally absurd disadvantage. No doubt a brake-shoe, even if continuously and well lubricated, would do some little braking, and similarly it is not certain that the loss of retarding friction was precisely in proportion to the loss of pressure on the wheels; but the error in throwing out such wasted power altogether must at best be small, while to keep it in makes a very large error, and one which might deceive the railroad public as to actual relative efficiency of the power brake-gear proper—the parts painted red in the tests. Fortunately, whether this correction be made or not makes no difference in the absolute rank of the brakes in the tests, but only in the degree of difference between them, and we shall, moreover, give their relative efficiency both with and without this correction.

Brake Test Diagrams, No. 2 Stops.

We present this week a second inset sheet, showing diagrams of all the "No. 2" stops made in the Burlington brake tests, a few excepted, the records of which were lost. These stops were all made from a speed of 40 miles an hour on a level, as nearly as might be, the brakes being applied at the same point, the No. 2 stop post.

In connection with the inset sheet giving all the No. 1 stops, which we published last week, we described in detail what these diagrams are, how they were obtained, and what they show. The two sets of diagrams will naturally be compared together, and the same description applies to each.

The following details of both sets of diagrams, however, were not explained last week:

1. In the 50 car mixed and loaded tests it will be seen that there is a long stretch before the stop proper began (500 ft. in the 20 miles per hour stops; 1,000 ft. in the 40 miles per hour stops) where steam was shut off. This was done to reduce as much as possible the severe shocks resulting from the application of the brakes by letting the train close up somewhat before the brakes were applied. The speed of the train fell of course after the steam was shut off, but the speed was taken at whatever it was in passing the stop-post.

2. This initial speed is shown in figures, in miles per hour, on the vertical line at the beginning of each stop, just above the base line.

3. The movements of the impact gauge in inches are shown by small circles at the end of horizontal lines, starting from the first vertical as a base. The length of the horizontal line is proportional to the movement of the gauge, and the latter is also given in figures. Where there was only one shock, there is only one of these lines; where there were several there is a line for each. When there was a shock too slight to move the impact gauge the small circle is put directly on the base-line.

The impact gauge was not thought of nor invented until late in the tests, after most of the 25-car tests and some of the 50-car tests had been made. Consequently only a portion of the diagrams show this record.

The gauge was simply a round disc of lathe-finished iron, 5 in. in diameter and 3 in. high, sliding in a trough of planed white pine. It was described and illustrated in our issue of July 30, 1886.

The diagrams of the No. 3 and No. 4 stops, made on the down grade, were similar in all essential respects to the No. 1 and No. 2 stops, which have been engraved, except that they were longer because of the down grade. The buffer brakes make a somewhat poorer relative showing on these down grade stops, as is natural from the fact that they depend on the force with which the engine crowds back against the train, which is reduced on down grades, but it does not appear necessary to engrave them also, as all necessary details of the action of the brakes are shown in the diagrams engraved and in the tabular records which appear in this and a following issue. The final records of the No. 3 and No. 4 stops have only this week become available. Therefore we are unable to present in this issue a tabulated computation of the percentage of efficiency of each brake, if it is to be given for all the stops together, as seems desirable, and hence we confine ourselves to the corrected official figures of initial speed, distance run, etc.

Rules Governing the Inspection of Cars at Points of Interchange.

At a meeting composed of R. H. Soule, New York, Lake Erie & Western and New York, Pennsylvania & Ohio; H. C. Blackall, Delaware & Hudson; John Medway, Boston, Hoosac Tunnel & Western, and J. W. Marden, Fitchburg, held at Binghamton, Oct. 21, 1886, for the purpose of arranging for the more prompt movement of cars at points of interchange between their respective roads, the following was unanimously adopted:

We will receive cars with:
 Truck bolsters showing a crack across section not more than 3 in. measured vertically.
 Draw springs with one break in outside coil. On card.
 Cracked draw-heads. On card.
 Draw-bars that can be pulled out by hand not to exceed two inches. On card.
 Draw-timbers properly reinforced. On card.
 Brake wheels with one cracked spoke when there are six spokes in wheel, i. e., a brake wheel must have five sound spokes.

We will not receive cars with:
 Running boards broken or defective.
 Brake step defective.
 Ladder round defective or missing.
 Wheels (double plate) with more than three cracked brackets.
 This agreement to take effect at once.

Foreign Railroad Notes.

Hungary has a "Minister of Communications" in charge of transportation affairs and especially of the State Railroads. He seems not to have a bed of roses—at least he doesn't keep his place long. The last one, Baron Kemény, has just resigned, the State Railroad expenses having enormously exceeded the estimates. He was the third Minister of Communications under the present Prime Minister, Tisza, and the seventh in the 19 years of Hungarian independence.

At a convention of German naturalists and physicians in Berlin recently, Mr. Lichtenberg, of Buda-Pesth, reported on the subject of the hearing of railroad men and the effect of imperfections in it on the safety of trains. He said that he had examined 250 railroad employes, and found no less than 92 of them, or 36 2/3 per cent. suffering from diseases of the ear. In 32 cases the cases were catarrhal affections, in three diseases of the labyrinth, and in 30 affections of the outer organ of the ear. He thought that many accidents charged to negligence were really due to imperfect hearing.

On the part of the Austrian Southern Railroad near Vienna, for the last 20 years, "workmen's commutation tickets" have been issued, on certificate from the authorities of the town they live in that they are without means and have work in another place. The third-class tickets are issued at the rate of \$1.53 per month for distances of 5 miles, and 9 1/2 cents per month for every additional kilometre (3/4 mile), and for several persons belonging to one family the

BURLINGTON BRAKE TESTS.

Official Corrected Records of Initial Speed in Miles per Hour, Distance Run and Time in Seconds of Stop.

(Important differences will be found in this table from other previously published records, especially in the initial speed, which could not be determined correctly when the records were read off during the tests).

NOTE.—In trip 110, Stop No. 1 was No. 111; Stop No. 2, 112; Stop No. 3, 113; Stop No. 4, 114, and similarly for all other runs and stops.			STOPS AT 20 MILES PER HOUR.						STOPS AT 40 MILES PER HOUR.					
			No. 1—On a Level.			No. 3—Down grade, 55 ft.			No. 2—On a Level.			No. 4—Down grade, 55 ft.		
			Speed. Miles per hour.	Distance run. Feet.	Time. Secs.	Speed. Miles per hour.	Distance run. Feet.	Time. Secs.	Speed. Miles per hour.	Distance run. Feet.	Time. Secs.	Speed. Miles per hour.	Distance run. Feet.	Time. Secs.
No. of trips.*	NAME OF BRAKE.	No. of cars.												
Engine Brake Tests—Emergency Stops. [Engine and tender followed by dynamometer car without brakes.]														
110	Westinghouse automatic.....	1	22.0	438	20 $\frac{1}{4}$	21.7	438	22 $\frac{1}{4}$	44.2	1,780	48 $\frac{1}{4}$	46.8	2,792	70
430	Westinghouse straight air.....	1	22.3	363	16 $\frac{1}{4}$	23.5	425	21 $\frac{1}{4}$	39.5	941	27 $\frac{1}{4}$	42.0	1,331	36 $\frac{1}{4}$
120	Eames, automatic.....	1	23.5	450	20 $\frac{1}{4}$	26.8	619	28	42.3	1,450	39	41.0	1,716	46 $\frac{1}{4}$
310	Eames, straight vacuum.....	1	22.2	335	16 $\frac{1}{4}$	23.4	387	21 $\frac{1}{4}$	41.3	1,069	32	42.6	1,336	40
130	American, steam, 1st test.....	1	26.3	460	18 $\frac{1}{4}$	23.5	454	22 $\frac{1}{4}$	42.4	1,319	35	39.8	1,382	40
741	American, steam, 2d test.....	1	23.3	275	12 $\frac{1}{4}$	19.3	253	13 $\frac{1}{4}$	41.3	889	25	37.7	925	20 $\frac{1}{4}$

25-Car Tests.

First Series.—General tests. All cars braked. Emergency stops.

160	Westinghouse Automatic.....	25	23.0	398	18 $\frac{1}{4}$	24.2	398	18	43.5	1,172	30	46.8	1,490	36 $\frac{1}{4}$
210	Westinghouse Automatic.....	25	21.5	349	15 $\frac{1}{4}$	21.7	361	17 $\frac{1}{4}$	40.5	1,029	27 $\frac{1}{4}$	45.0	1,492	34
220	Westinghouse Automatic.....	25	22.1	335	14 $\frac{1}{4}$	20.0	320	14 $\frac{1}{4}$	40.0	979	25 $\frac{1}{4}$	44.0	1,506	35
360	Eames Automatic Vacuum.....	25	19.5	426	20 $\frac{1}{4}$	21.4	588	28 $\frac{1}{4}$	37.7	1,369	43 $\frac{1}{4}$	41.7	2,811	74 $\frac{1}{4}$
410	Eames Automatic Vacuum.....	25	21.4	473	22	20.0	485	25 $\frac{1}{4}$	36.3	1,344	42	39.7	2,002	57 $\frac{1}{4}$
420	Eames Automatic Vacuum.....	25	22.2	453	21 $\frac{1}{4}$	20.5	511	27	39.0	1,477	43 $\frac{1}{4}$	43.8	2,465	66 $\frac{1}{4}$
730	American buffer.....	25	23.8	591	25 $\frac{1}{4}$	23.5	725	37	38.1	1,718	51 $\frac{1}{4}$	42.3	3,040	82 $\frac{1}{4}$
750	American buffer.....	25	21.7	476	22 $\frac{1}{4}$	22.2	628	30 $\frac{1}{4}$	38.0	1,487	44 $\frac{1}{4}$	40.1	2,763	75
760	American buffer.....	25	23.2	606	28 $\frac{1}{4}$	21.0	548	29	38.7	1,633	50 $\frac{1}{4}$	41.0	2,774	75
320	Widdifield & Button buffer.....	24	22.5	500	22	21.7	588	39	39.0	1,439	49 $\frac{1}{4}$	41.8	2,781	83
330	Widdifield & Button buffer.....	25	22.0	438	35	20.3	573	27 $\frac{1}{4}$	38.8	1,667	49 $\frac{1}{4}$	42.2	2,612	75
340	Widdifield & Button buffer.....	25	22.0	503	23 $\frac{1}{4}$	21.0	549	28	40.5	1,889	64 $\frac{1}{4}$	41.3	3,018	84 $\frac{1}{4}$
640	" " (after adjustment).....	25	22.2	681	41	22.4	1,270	71	39.3	2,150	70	42.5	4,033	109 $\frac{1}{4}$
1,750	Rote buffer.....	25	23.3	880	43 $\frac{1}{4}$	21.4	1,207	64	35.8	2,175	77 $\frac{1}{4}$	Ran past distance post.		
1,830	Rote buffer.....	25	23.7	1,016	50	21.6	1,114	67	34.7	2,341	81 $\frac{1}{4}$	40.7	5,566	139

Second Series; Special Tests. Rear 12 cars cut out. Emergency Stops.

1,550	Westinghouse.....	25	24.5	720	13 $\frac{1}{4}$	23.6	666	30 $\frac{1}{4}$	41.8	1,690	48	40.0	2,056	59 $\frac{1}{4}$
1,530	Eames.....	25	23.0	615	31	22.0	636	34	40.5	1,872	57 $\frac{1}{4}$	39.5	3,017	91
1,740	American.....	25	24.0	760	34	23.8	1,184	52	38.8	1,858	56 2-4	40.9	4,341	117
810	Widdifield & Button.....	25	21.9	378	28	21.0	800	39 $\frac{1}{4}$	38.8	1,858	56 2-4	42.8	3,565	94 $\frac{1}{4}$
820	" ".....	25	22.8	625	30	24.1	913	40	40.0	1,892	56	41.3	3,730	99 $\frac{1}{4}$

Third Series. Same as above. Service Stops.

1,540	Westinghouse.....	25	26.9	968	36 $\frac{1}{4}$	26.6	960	38 $\frac{1}{4}$	40.7	1,652	46	41.3	2,672	71 $\frac{1}{4}$
1,510	Eames.....	25	22.0	681	34 $\frac{1}{4}$	20.7	964	46	37.0	1,874	59	40.8	3,384	102
1,730	American.....	25	22.3	805	37 $\frac{1}{4}$	24.5	1,379	60	36.0	2,130	65	41.5	4,917	134

Fourth Series.—Hand Brake Tests.—Engine and tender power brakes, and such hand brakes as could be applied by three brakemen, starting out from cab and caboose on signal in stops on level grade (stops 1 and 2) and on top of train in stops on down grade (3 and 4).

140	Westinghouse train, C., B. & Q. cars.....	25	22.0	983	45	21.6	1,076	48	42.	2,769	67	45.4	3,259	70
710	American train, St. L. & S. F. cars.....	25	20.0	1,042	47 $\frac{1}{4}$	22.3	1,392	63	34.5	2,267	74 $\frac{1}{4}$	37.3	4,063	104
230	Widdifield & Button train, Lehigh V. cars.....	24	18.0	774	43	20.0	1,074	49	40.	2,759	73 $\frac{1}{4}$	40.0	3,493	81

50-CAR TESTS.

First Series; Empty Cars; General Tests. All cars braked. Emergency stops.

610	Westinghouse.....	50	20.3	354	16	23.0	431	17 $\frac{1}{4}$	40.0	927	22 $\frac{1}{4}$	41.6	1,104	22
620	Westinghouse.....	50	23.5	424	17 $\frac{1}{4}$	23.0	427	17 $\frac{1}{4}$	40.0	922	22 $\frac{1}{4}$	43.0	1,116	24 $\frac{1}{4}$
440	Eames.....	49	21.0	441	18	23.2	524	19	37.0	1,120	31 $\frac{1}{4}$	39.0	1,486	39 $\frac{1}{4}$
510	Eames.....	49	20.8	414	18	23.0	497	20	37.2	1,055	29 $\frac{1}{4}$	40.6	1,416	38
520	Eames.....	49	22.4	437	19	22.0	448	18	37.7	1,016	28 $\frac{1}{4}$	40.5	1,399	35 $\frac{1}{4}$
830	American.....	50	20.8	424	25	20.4	445	24 $\frac{1}{4}$	Omitted.	Omitted.	Omitted.	34.4	1,901	65

Second Series; Empty Cars. Same as above. Service stops.

630	Westinghouse.....	50	22.8	1,041	48 $\frac{1}{4}$	22.3	2,077	76 $\frac{1}{4}$	39.7	2,524	59 $\frac{1}{4}$	38.3	2,059	46 $\frac{1}{4}$
1,720	Westinghouse.....	49	20.4	1,005	41 $\frac{1}{4}$	22.4	944	33 $\frac{1}{4}$	37.0	1,175	29 $\frac{1}{4}$	38.4	1,712	35 $\frac{1}{4}$
1,810	Eames.....	50	21.5	497	22 $\frac{1}{4}$	21.3	859	34	34.2	1,152	32	39.4	1,572	38 $\frac{1}{4}$
840	American.....	41	23.2	771	37 $\frac{1}{4}$	23.2	1,019	47	33.5	1,480	51 $\frac{1}{4}$	41.0	2,919	82

Third Series; Empty Cars; Special tests. Rear 20 cars cut out. Emergency stops.

1,630	Westinghouse.....	49	22.0	379	17 $\frac{1}{4}$	20.2	451	21 $\frac{1}{4}$	36.8	927	25 $\frac{1}{4}$	37.0	1,077	30
1,710	Westinghouse.....	50	21.0	383	18	Omitted.	Omitted.	.....	Omitted.	Omitted.	Omitted.	Omitted.	Omitted.	Omitted.
1,820	Eames.....	48	22.7	511	22 $\frac{1}{4}$	24.1	657	29	30.7	877	31 $\frac{1}{4}$	39.0	2,024	56 $\frac{1}{4}$
1,210	American.....	48	21.5	479	24	22.3	558	27 $\frac{1}{4}$	Omitted.	Omitted.	.....	37.3	1,880	54 $\frac{1}{4}$

Fourth Series; Empty Cars. Same as above. Service Stops.

1,620	Westinghouse.....	49	22.5	535	23 $\frac{1}{4}$	22.5	639	26 $\frac{1}{4}$	38.1	1,232	32 $\frac{1}{4}$	39.7	1,338	32 $\frac{1}{4}$
1,760	Eames.....	50	21.2	544	21 $\frac{1}{4}$	20.0	614	29 $\frac{1}{4}$	35.7	1,213	34 $\frac{1}{4}$	38.6	1,709	45 $\frac{1}{4}$
1,810	American.....	48	22.0	734	33	23.6	1,040	40 $\frac{1}{4}$	35.4	1,583	49	37.1	2,389	64 $\frac{1}{4}$
1,530	Widdifield & Button.....	50	24.2	877	40	21.2	731	42	37.3	2,231	71	40.5	4,592	125

Fifth Series; Mixed Cars. All cars braked. Service Stops. Steam shut off 500 and 1,000 ft. before reaching stop post.

910	Westinghouse.....	50	21.2	608	26	22.5	772	0	39.3	1,592	40	41.6	1,787	43
920	Westinghouse.....	48	20.5	739	33	23.1	655	26 $\frac{1}{4}$	39.4	1,522	37	43.9	1,811	41 $\frac{1}{4}$
930	Westinghouse.....	49	20.7	636	26	24.5	600	24 $\frac{1}{4}$	39.0	1,329	30 $\frac{1}{4}$	41.5	1,823	40 $\frac{1}{4}$
1,020	Eames.....	48	20.5	905	38	21.9	1,067	42 $\frac{1}{4}$	35.0	1,667	47 $\frac{1}{4}$	40.0	3,665	91
1,030	Eames.....	48	20.0	710	31 $\frac{1}{4}$	22.7	964	39 $\frac{1}{4}$	Broke in two.			38.2	2,505	64
1,040	Eames.....	48	22.2	826	34 $\frac{1}{4}$	22.3	976	36 $\frac{1}{4}$	35.5	1,610	46 $\frac{1}{4}$	40.0	2,757	73

Sixth Series, Loaded Cars. All cars braked. Service Stops. Steam shut off as above.

1,120	Westinghouse.....	50	23.5	709	20 $\frac{1}{4}$	23.4	814	30	38.0	1,455	36 $\frac{1}{4}$	39.7	1,950	47
1,130	Westinghouse.....	50	21.5	1,302	48	24.4	915	31 $\frac{1}{4}$	36.6	1,398	37 $\frac{1}{4}$	37.0	2,065	50
1,140	Westinghouse.....	49	19.7	720	33 $\frac{1}{4}$	23.3	871	32 $\frac{1}{4}$	32.5	1,255	36 $\frac{1}{4}$	35.4	2,092	51
1,330	Eames.....	49	21.8	946	40 $\frac{1}{4}$	24.7	1,544	62	32.3	1,733	54 $\frac{1}{4}$	34.2	2,724	83 $\frac{1}{4}$
1,340	Eames.....	49	19.5	728	35	22.8	1,036	43	29.8	1,425	47 $\frac{1}{4}$	32.0	1,908	64
1,350	Eames.....	48	19.3	740	34 $\frac{1}{4}$	21.8	1,009	44 $\frac{1}{4}$	29.4	1,423	49 $\frac{1}{4}$	34.8	2,088	84

NOTE.—The mixed trains were in each case made up of half-loaded (40,000 lbs. loads) and half empty cars. three-fourths of the loaded cars being placed in the rear half of the train. Besides the number of cars stated there was in all trains a dynamometer car at the head of the train and a way car at the rear, both without brakes. One truck of the middle car was also always without brakes, its brake-rod being attached to a recording apparatus.

price is still lower—\$1.01 for the first 8 kilometres (5 miles), and 6 $\frac{1}{4}$ cents for every additional kilometre. The first rate would make the charge from the Battery to Harlem \$2.10 per month, and the second would make it \$1.38 each for two or more of one family. In the year 1885 1,856 such monthly tickets were sold, and in the first eight months of this year 1,219—an average of less than 155 per month.

The great petroleum firm of Russia, Nobel Brothers, have

had a screw steamer built for carrying petroleum in bulk. It is 200 ft. long by 31 ft. beam, and has capacity for about 860,000 gallons of petroleum in 16 air-tight tanks or compartments, arranged to be filled by pumps from cars or tanks, and unloaded in the same way, without exposure to the air. The pipes for the escape of the air from the tanks as they are filled discharge by one common vent, where three sheets of wire cloth guard against ignition of gas on the principle of the Davy miner's lamp. This vessel,

called the "Petrolia," carried its first cargo from St. Petersburg to the German port of Lubeck. To reach St. Petersburg the petroleum makes a long journey across the Caspian Sea, up the Volga and by rail, and it would seem more economical to carry it by rail, or pipe it, from the wells on the Caspian to the eastern end of the Black Sea, whence the way is open to the sea. This is the twentieth vessel the Nobel Bros. have procured for their petroleum, but nearly all the others are on the Caspian Sea and the Volga.



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE YEAR'S GRAIN CROPS.

The report of the Department of Agriculture now gives estimates of all the grain crops of the year, subject to correction in the table usually published in December, which will not be likely to change any of the figures much except possibly those for corn, the yield of which has yet to be subjected to the final test of gathering. There are two fairly good crops, winter wheat and oats, but the yield of spring wheat and of corn has been unsatisfactory. In millions of bushels, the crops in successive years have been:

Year.	Wheat.	Corn.	Oats.	Barley.	Rye.	Total.
1879	459	1,755	408	44	20	2,686
1880	499	1,717	418	45	25	2,704
1881	380	1,194	417	41	21	2,053
1882	504	1,617	468	49	30	2,688
1883	421	1,531	371	50	28	2,392
1884	513	1,785	584	51	28	2,971
1885	357	1,936	630	47	23	2,993
1886	452	1,650	620	53	28	2,803

The increase over last year of 95 millions in the wheat crop reported is not quite equal in value to the decrease of 286 millions in the corn crop, but the number of bushels of grain of all kinds is greater than in any other year except 1885 and 1884.

If this were a country with a stationary population, or even with slight changes in the area cultivated, like European countries, this would be a very satisfactory showing. But the population in 1879 was 48,680,000, and now it is about 60,000,000, nearly one-fourth greater, and a crop corresponding to that of 1879 per inhabitant should be 3,330 millions, instead of 2,803. Doubtless, however, the increase in population has been much greater in proportion than the growth of agriculture, which is inevitable and not necessarily a misfortune. But it is a misfortune when the returns made by this, the greatest of our national industries, are unsatisfactory, and if we compare the production with the extent of the industry, we shall be able to judge as to that much better than from the production alone.

Now the area occupied by the several grains has been in thousands of acres:

Year.	Wheat.	Corn.	Oats.	Barley.	Rye.	Total.
1879	35,430	62,369	16,145	1,998	1,842	117,784
1880	37,987	62,318	16,188	1,843	1,768	120,103
1881	37,769	64,262	16,832	1,967	1,789	122,559
1882	37,067	65,659	18,405	2,272	2,228	125,721
1883	36,456	68,302	20,325	2,379	2,15	129,676
1884	39,476	69,684	21,301	2,426	2,195	135,082
1885	34,189	73,130	22,784	2,426	2,035	134,564
1886	36,767	75,690	23,280	2,499	2,000	140,236

Compare the acreage above with the production. The total area of grain this year is 19 per cent. greater than in 1879, while the number of bushels produced is but 8 per cent. greater. That was a year of an extraordinary yield of corn, it is true; but an examination of the two tables shows that this is a year of yields decidedly below the average, and the larger amount of capital, labor and land devoted to grain crops has not had an adequate return. Since 1879 there has been an enormous extension of railroads through new coun-

try, primarily to secure produce from its land, and much the larger part of this new railroad is in a grain country. But compared with the railroad mileage the increase in grain production has been insignificant. Per acre, per inhabitant and per mile of railroad the number of bushels produced has been:

	Per acre.	Per person.	Per mile railroad.
1879	22.8	53.2	32,850
1880	22.5	53.9	31,260
1881	16.7	39.6	21,994
1882	21.4	50.1	26,034
1883	20.2	47.4	22,834
1884	22.0	52.7	24,433
1885	22.2	51.2	23,868
1886	20.0	46.7	21,730

Yield per acre is a very rough standard for all grains lumped together, but as it is the acreage of corn and oats which has increased, while that of wheat has not increased, manifestly equal yields every year of each crop would have made the average per acre greater this year than formerly. In fact, it is the smallest of the eight years except 1881, when both wheat and corn crops were wretched. The yield per inhabitant is also smaller this year than in any other except 1881, and the yield per mile of railroad is even smaller than then.

It is not necessary to conclude from this that the country is in a bad way, and that traffic will be light until the next harvest; but we cannot escape the conclusion that the farmers whose business is grain-growing chiefly have had, on the whole, a decidedly bad year, and that without any reference to prices, which are unusually low. It does not matter that Dakota produced substantially as much wheat this year as last, for it had no less than 18 per cent. more land sown with wheat, and the decrease of 286 millions or so from last year in the corn crop is made all the harder to bear because there were 2,560,000 more acres planted with corn. We had had very large corn crops for two successive years, and these had done much for the farmers without making them exactly prosperous, and the lighter yield this year cannot fail to be a serious misfortune to them.

That in spite of this unsatisfactory condition of agriculture—or rather of grain growing, which is a very large part, but by no means the whole of agriculture—trade and transportation should be so active emphasizes what we have often called attention to recently, that the part which Northern agriculture plays in our national economy has been growing smaller of late years, which is shown best by the fact that the increase in grain acreage since 1880 has been but one-sixth, while the increase in population has been one-fifth. The statistics indicate, however, that the growth has been more rapid in the dull times than in the prosperous times, which is usually the case in this country, when the increase in population is absorbed by other industries so long as they are prosperous, but is forced into agriculture, which affords a subsistence at least, whether it is prosperous or not, when other industries are not prosperous and do not grow. Thus, from 1879 to 1882 the increase in grain acreage was only 7,987,000, or 6.7 per cent.; while from 1883 to 1886, one year longer, it was 14,515,000 acres, or 11½ per cent.—an average increase of 2,646,000 acres per year in the good times and 3,638,000 acres per year in the bad ones. The failure to increase from 1884 to 1885 was chiefly due to the destruction of winter wheat in the winter of 1884-85, on account of which 2,820,000 acres sown were not harvested. Much of this acreage was occupied by some spring crop, but we cannot tell how much. The increase in acreage from 1884 to 1886 measures fairly the progress, which was much less than for the two years previous. From 1879 to 1882 the average yearly increase was almost exactly 2 per cent. yearly; since 1882 it has been about 2.85 per cent., which latter is very nearly as great as the rate of increase in population. We must measure the progress of this industry by the acreage, and not by the production, which varies with the seasons, though the immediate effect on the prosperity of the country is to be measured by the production.

In order that undue importance may not be given to the grain production, it is well to observe the average production per inhabitant. Comparatively, there has been on the whole a considerable reduction in this, but it is, after all, not a very large part of the total annual production of all goods. Measured by the prices at Chicago, which are considerably above the average value at the place of production, the grain produced this year is worth about \$1,108,000,000, or \$18.40 per inhabitant, while in 1880 it was worth \$1,369,000,000, or \$27.40 per inhabitant. The sums are certainly not so large a fraction of the average national income that the decrease in them, amounting to just \$9 each, is a very serious matter for the nation at large. The fall in price, indeed, is of not much importance to any except the grain growers, as but a small part of the production is exported, and what the farmers lose in the price on the home consumption the rest

of us gain. But nothing shows better the more unfavorable position of the farmer than the fact that the value per acre (in Chicago) of the grain produced, which was \$11.40 in 1880, this year is but \$7.87—a decrease of 31 per cent. To the man growing 100 acres of grain this means \$353 less income, which is a very large part of the whole income, and more than the profits of most such farmers. Almost everything else costs less now except, perhaps, labor; but the farmer consumes little, and the smaller cost of production now is due chiefly to lower prices of agricultural implements, and can only be a small part of the decrease in the value of products.

Just because there is now activity in trade and traffic, in spite of the unfavorable position of agriculture, we may know that agriculture is a less important part of the national industry than formerly. But we should not forget that the present prosperity is very largely caused by activity in construction, especially railroad construction, which does not at the time increase production, but if it is done at the proper time and in the proper places will result in an increase in production hereafter. Such activity at the time gives employment to labor and makes most industries prosperous; but it must be followed by an increase in the production of consumable goods or it will certainly result in hard times, for we shall have more machinery to make and carry goods, and if there is not more produced shall have to dismiss the men whom we have employed in construction, which will make them unable to obtain anything more than the bare necessities, and we shall have railroads and factories in excess of our needs, just as we did after 1873 and after 1881. These great fluctuations in the amount of construction naturally cause disaster; but the exceptional activity usually lasts for several years, which are very prosperous years, before the disaster comes; and this is the first year of the present activity in construction. We may build as much as 7,000 miles of railroad this year, which is certainly too much to build in one year; but if there is not similar activity, or greater, for two or three more years, we shall probably not feel the worse for it. Usually, however, when railroad construction begins to be active it grows more and more so, as after the war when the yearly mileage built was:

1866.	1867.	1868.	1869.	1870.	1872.	1883.
1,716	2,449	2,979	4,615	6,070	3,878	4,097

And again after 1878, when for five years the average construction had been but 2,290 miles.

1878.	1879.	1880.	1881.	1882.	1883.	1884.
2,629	4,746	6,876	9,796	11,568	6,819	3,974

Last year we were down to 3,131 miles, and now we have turned again. We have had, however, but a short interval since the previous period of great activity in construction, and we may hope that this one will not last so long nor be carried so far as that one. The South and the country west of the Mississippi are full of projects, however, and if the money can be raised we shall soon be building more than ever before.

THE PROPOSED "UNIFORM GENERAL RULES."

Probably no task has been assigned to any committee of the General Time Convention which seemed so beyond hope of a successful result as that of preparing a code of rules which should meet the wants of all classes of railroads, from the single track *monad* of a railroad up to the perfected four-track trunk line.

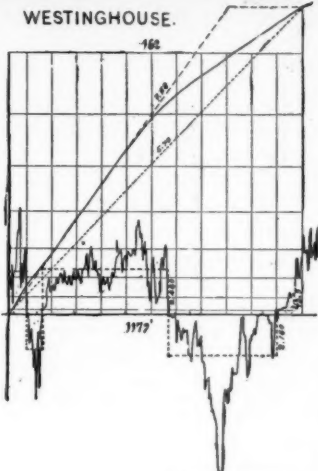
That the Committee held nine several meetings, judiciously submitting the conclusions of each meeting in printed form to a large body of practical men in every department of service, shows with how much earnestness they pursued the object of their labors; and the results which they spread before the convention and which we printed in our last number, justify the highest estimate of the eminent ability of the members of the Committee. We do not remember of any piece of similar work which has been better done.

The rules, as printed, are quite sufficient to establish uniformity in railroading throughout the United States and Canada, which was their principal object; they might go into general use now upon any portion of the railroads in the country, without fear of any considerable alterations being made in them at their final revision by the convention, because they are based upon the widest experience and sound judgment. The only changes which they will be likely to undergo will be by the addition of certain particulars which will doubtless suggest themselves from time to time, and which will not reach to the basis or theory of these rules in any manner.

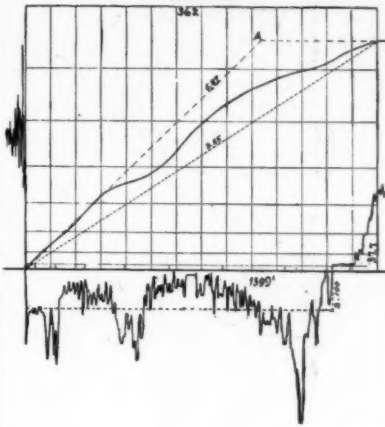
Many personal prejudices will have to be met and discussed over again, as they have doubtless been by the Committee, before the members of the convention who have passed their lives on small roads with little traffic will be able to appreciate the value of the deductions which have been made by older or more experienced men from their larger opportunities.

First Run.

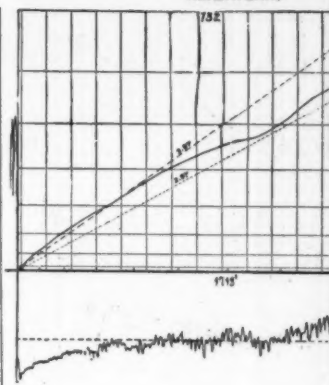
WESTINGHOUSE.



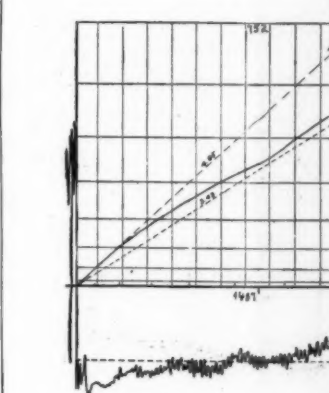
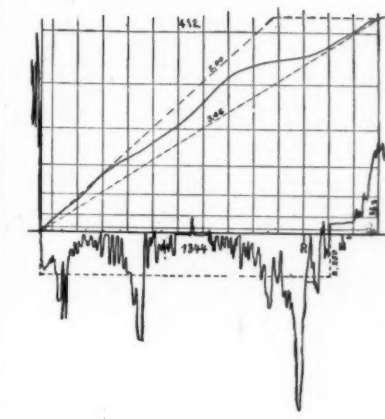
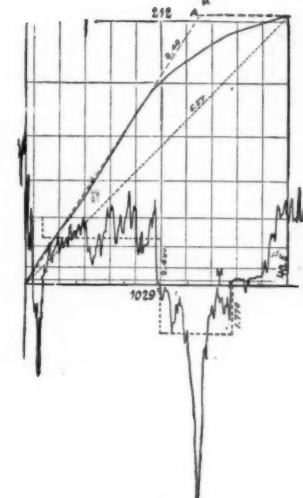
EAMES.



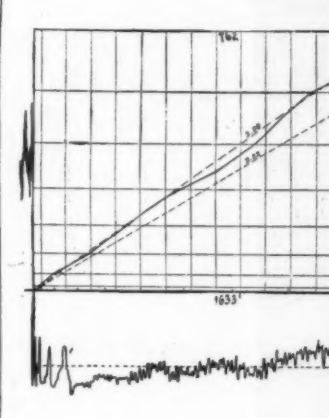
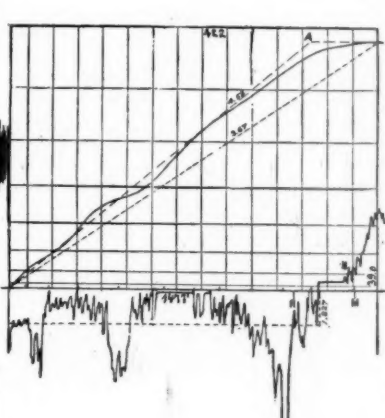
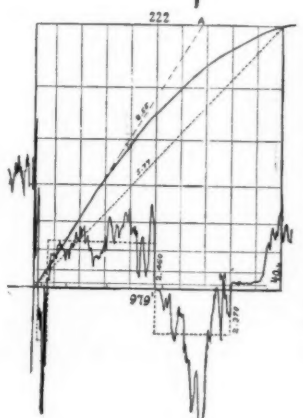
25 CAR MIXED
AMERICAN.



Second Run.



Third Run.

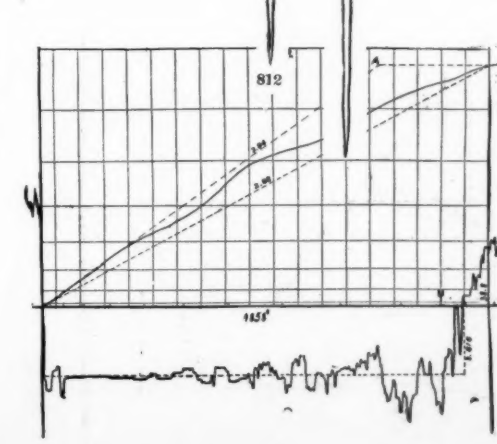
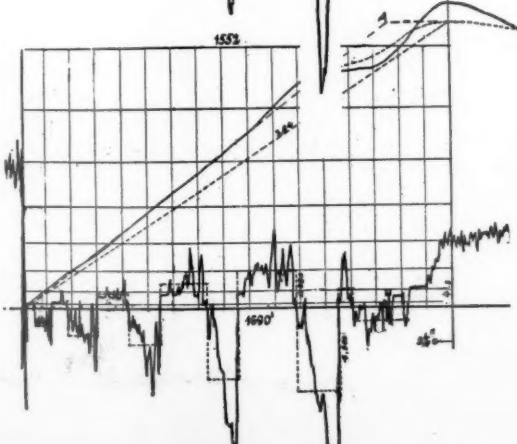
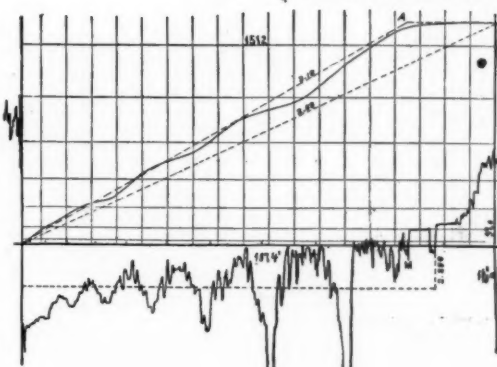
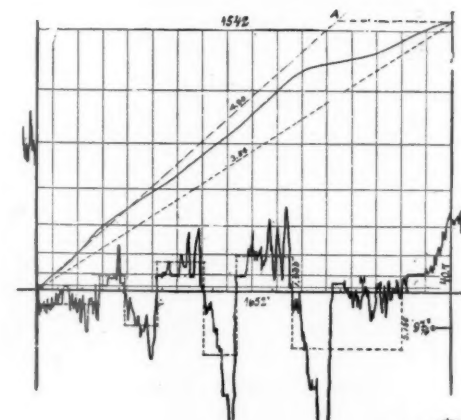


WESTINGHOUSE.

EAMES.

AMERICAN.

25 CAR MIXED—REAR 12 CUT OFF
First Horizontal Row—Service Stops—Second Row

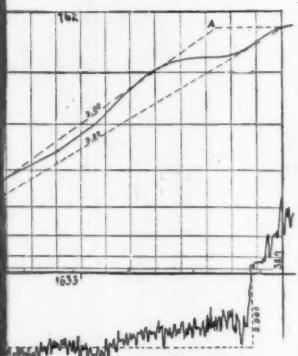
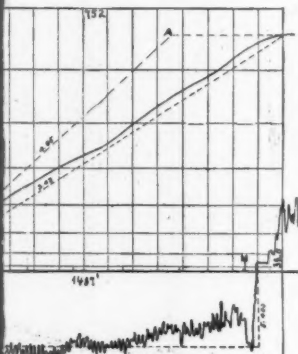
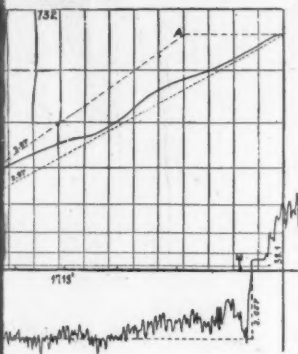


WESTINGHOUSE.

EAMES.

("A" line, 4.29.)

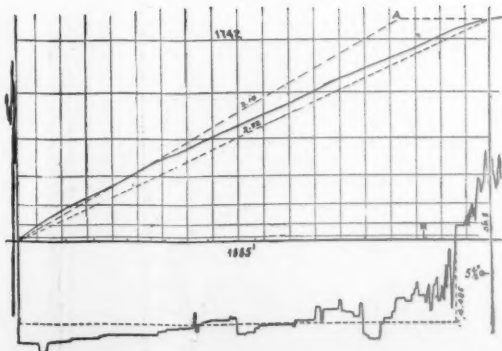
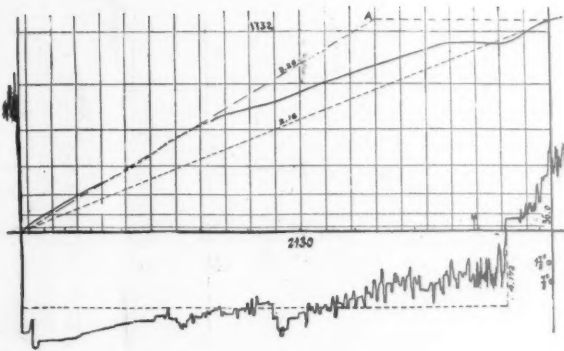
25 CAR MIXED LOADED AND EMPTY-GENERAL TESTS-EMERGENCY STOPS.
AMERICAN.



AMERICAN.

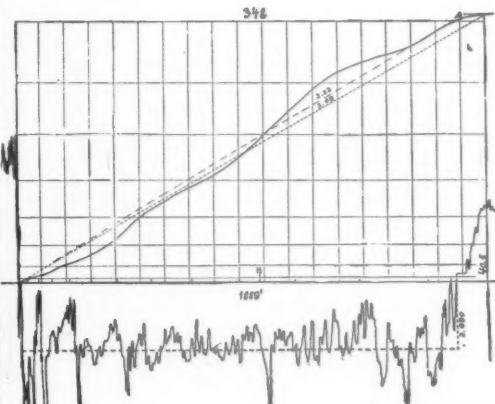
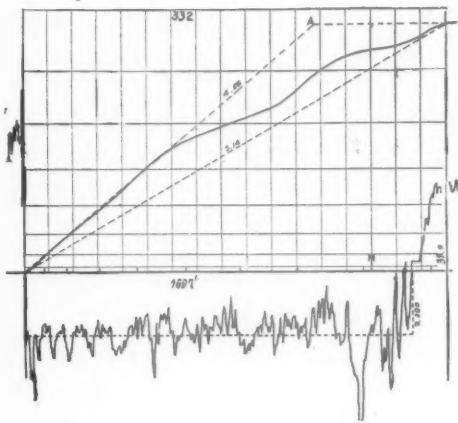
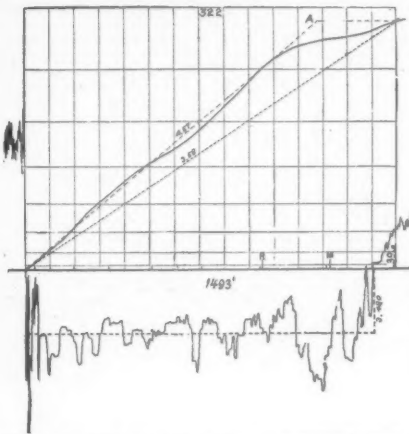
REAR 12 CUT OUT.

Stops-Second Row-Emergency.



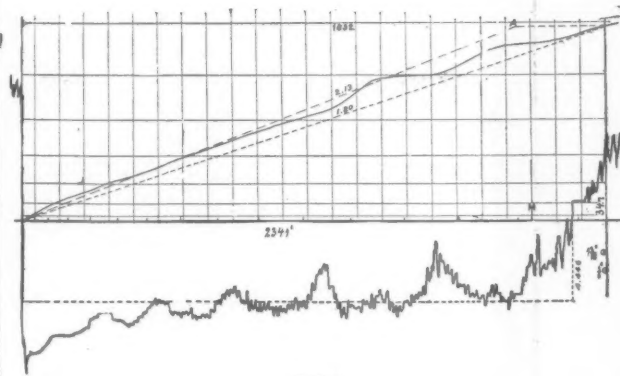
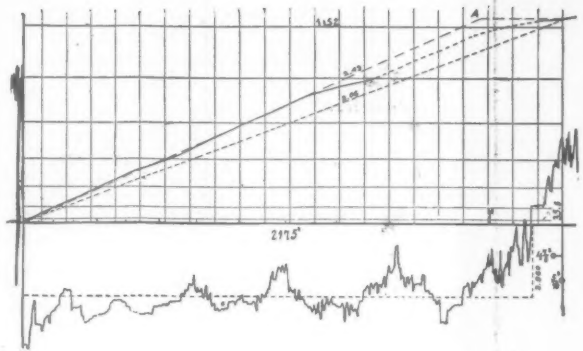
AMERICAN.

WIDDIFIELD & B.



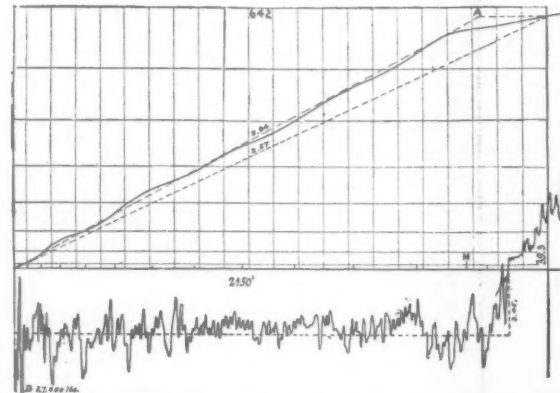
WIDDIFIELD & B.

ROTE.

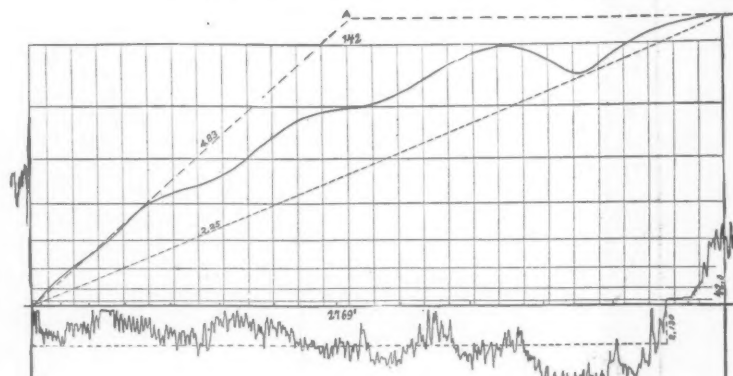


ROTE.

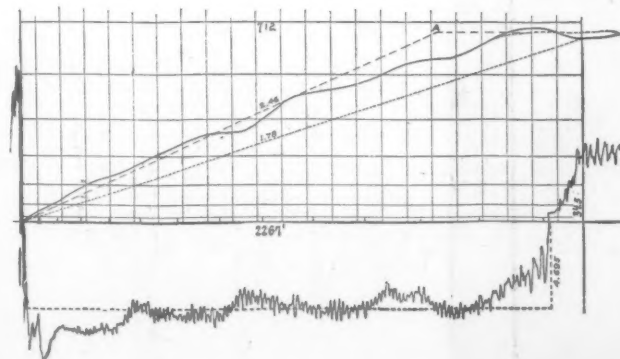
WIDDIFIELD & B. (Fourth Trial.)



25 CAR MIXED-HAND AND ENGINE BRAKES.



WESTINGHOUSE TRAIN.



AMERICAN TRAIN.

50 EMPTY CARS—GENERAL TESTS.

Emergency Stops.

Servi

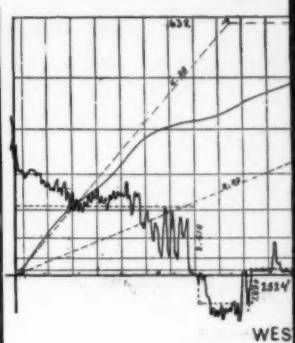
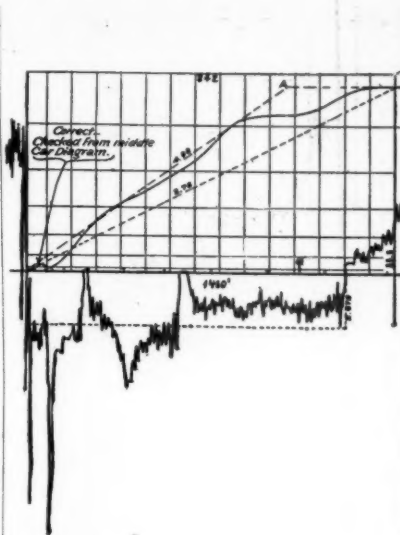
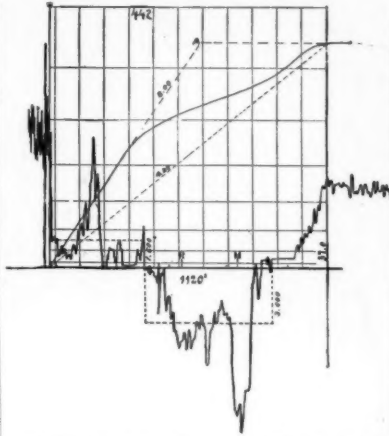
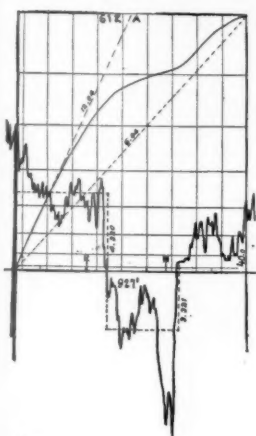
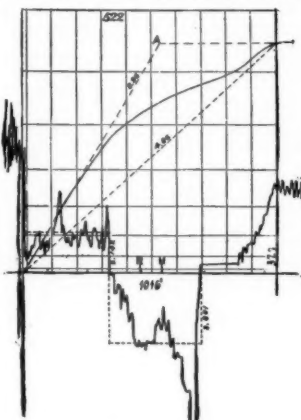
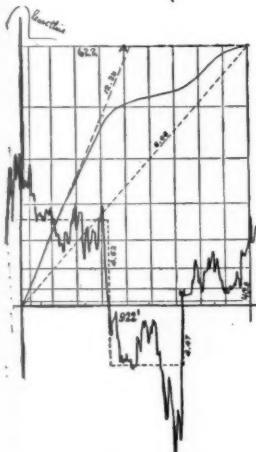


Diagram lost for Emergency Stop No. 512.



Further American Tests Abandoned.

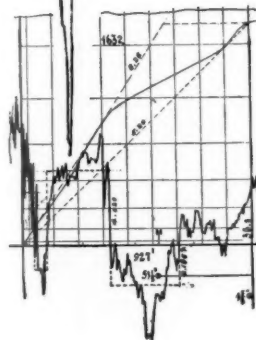
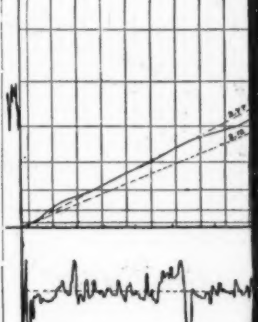
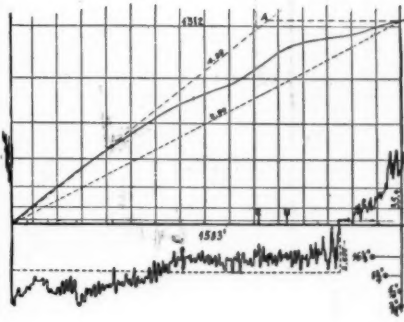
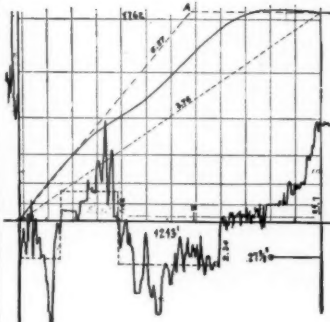
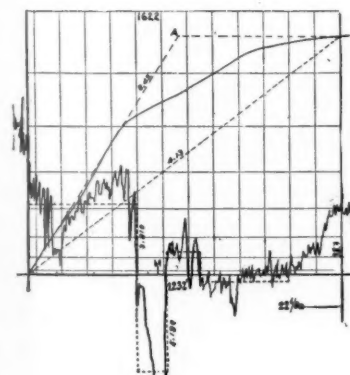
WESTINGHOUSE.

EAMES

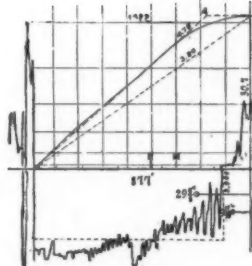
AMERICAN.

50 EMPTY CARS—REAR 20 CUT OUT.

First Horizontal Row—Service Stops—Second Row—Emergency.



1822 Eames Emergency Stop—
Diagram lost.



Emergen

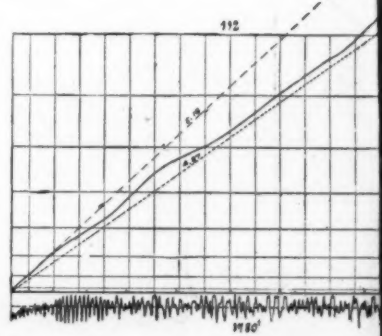
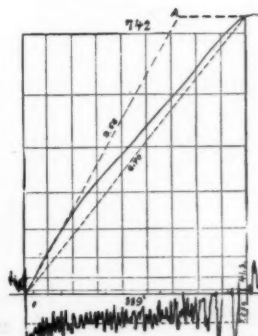
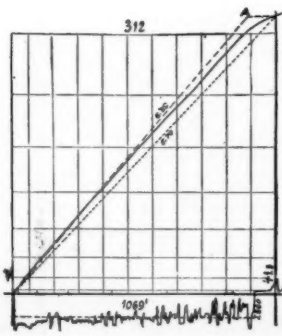
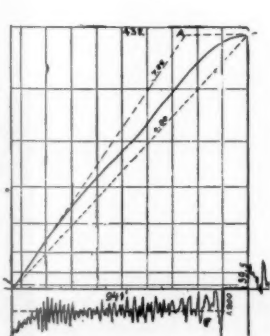
WESTINGHOUSE.

EAMES.

AMERICAN.

WIDDIF

ENGINE AND DYNAMOMETER CAR ON



WESTINGHOUSE.

EAMES.

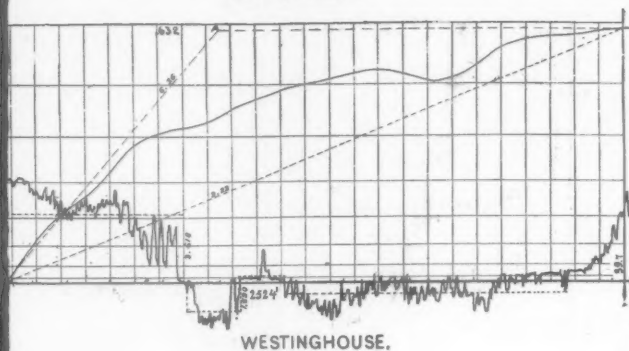
AMERICAN.

WESTINGHOUSE, 1

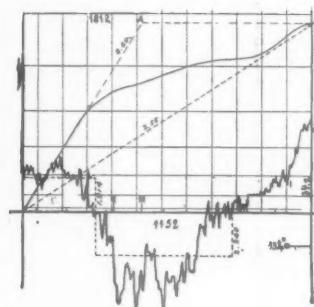
SECOND SERIES—STRAIGHT AIR OR VACUUM.

FIRST

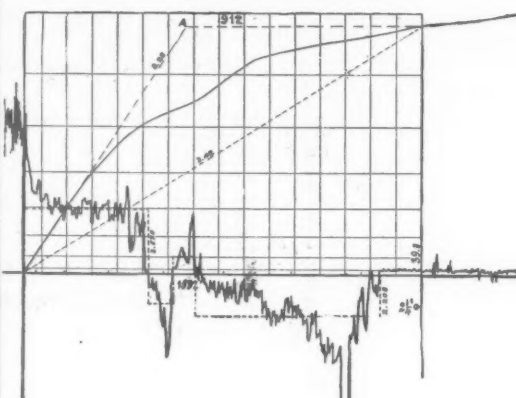
Service Stops.



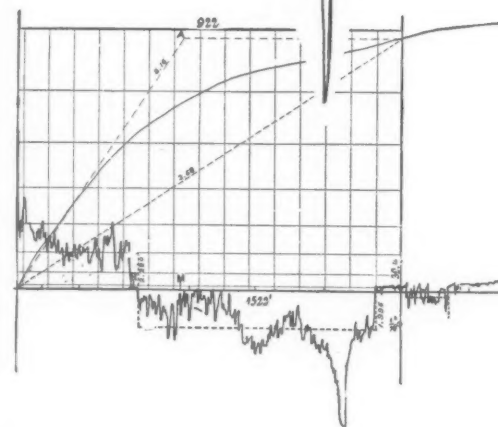
WESTINGHOUSE.



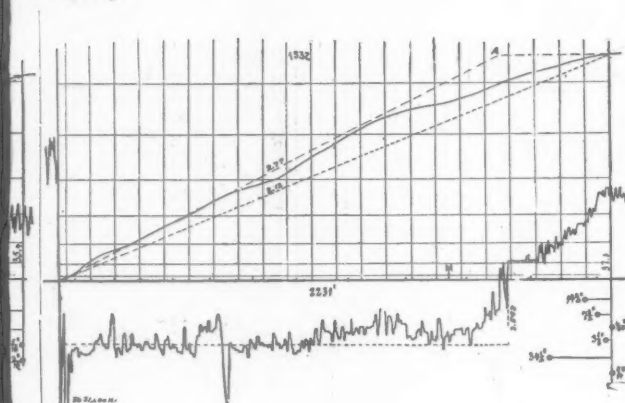
EAMES.



WESTINGHOUSE.

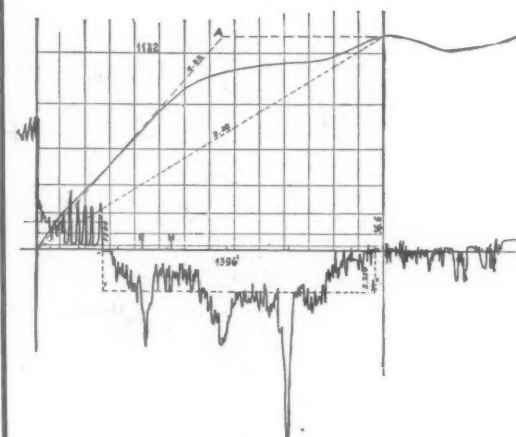


UT.
Emergency.

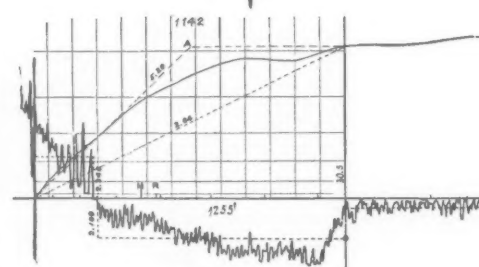


Emergency Stop Abandoned.

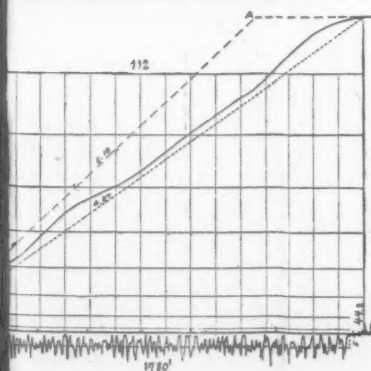
WIDDIFIELD & BUTTON.



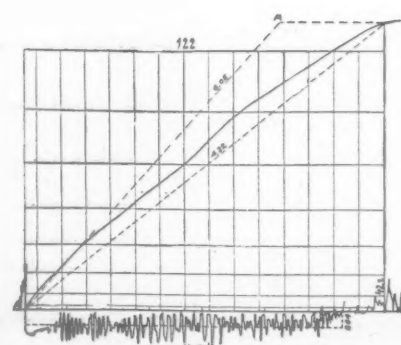
WESTINGHOUSE.



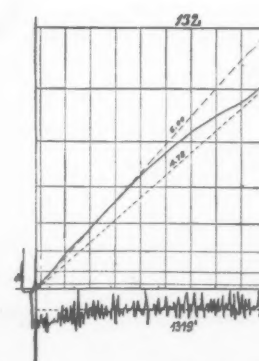
DYNAMOMETER CAR ONLY.



WESTINGHOUSE.



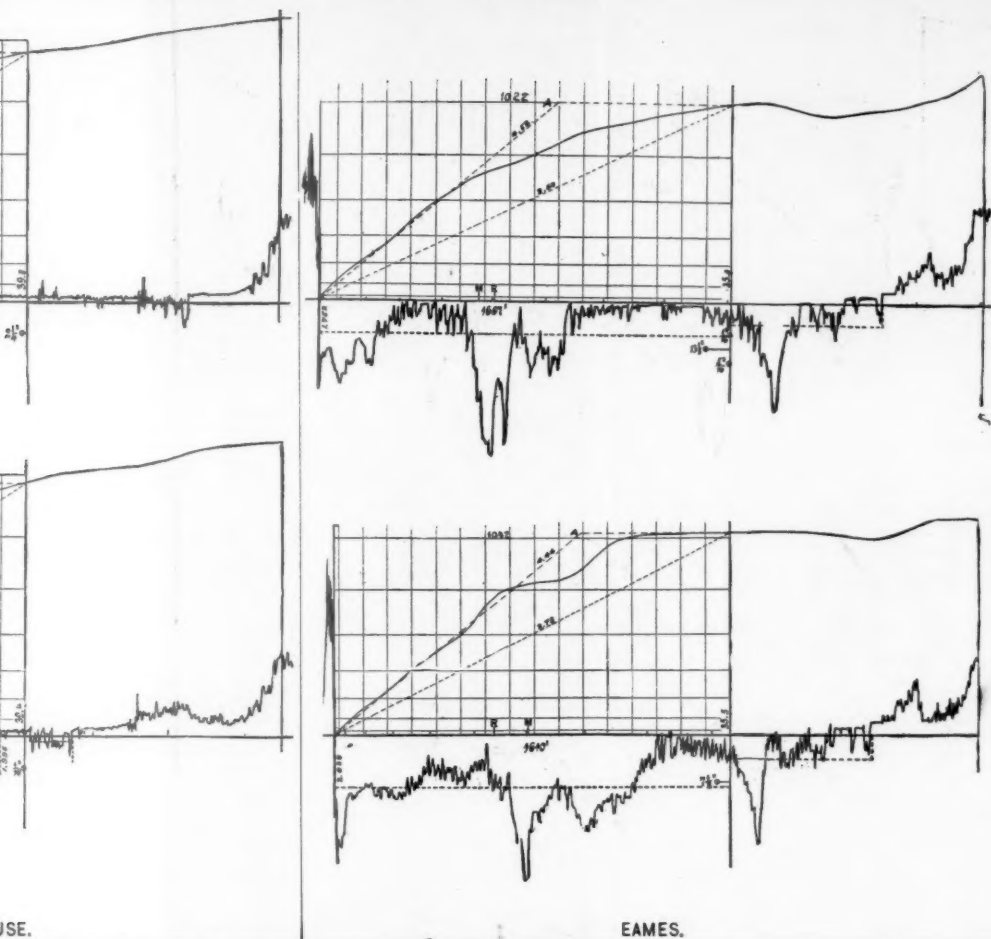
EAMES.



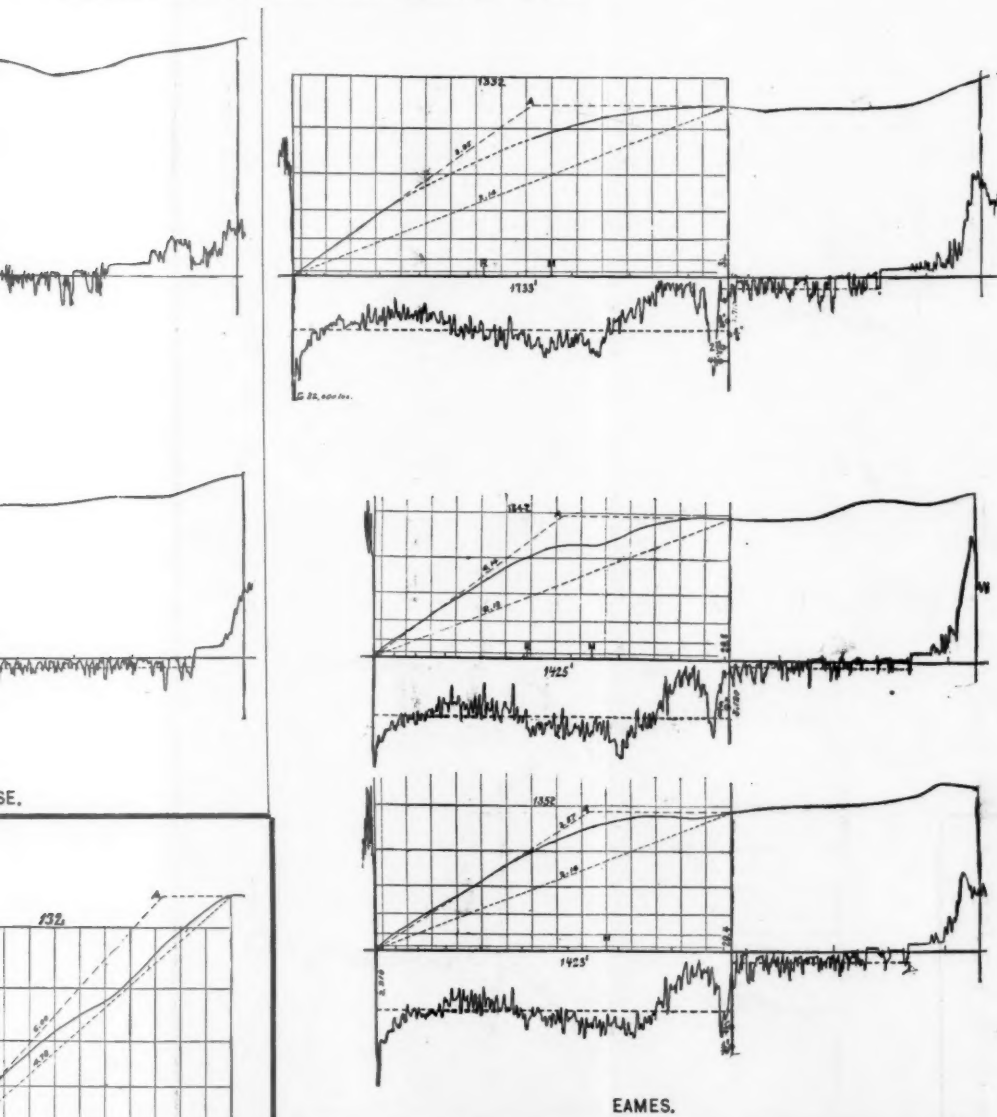
AMERICAN.

FIRST SERIES-AUTOMATIC. (American Apparatus same in both Series.)

FIXED LOADED AND EMPTY—GENERAL TESTS—SERVICE STOPS.



50 LOADED CARS—GENERAL TESTS—SERVICE STOPS.



BURLINGTON BRAKE TESTS.

OFFICIAL RECORD AND ENERGY DIAGRAMS.

No. 2 STOPS—from 40 miles per hour, on a Level.

They should remember that with the development of the country every railroad is likely to grow in traffic, and that what is good railroading upon a large road is sure to be the better way for a smaller one, even though a present necessity for some particular regulation is not felt.

Having herein expressed a general and unqualified satisfaction with the rules as they stand, we shall now submit here a few modifications which it seems to us may properly be considered before the final action of the convention, and shall subject them to more detailed criticism hereafter.

First, it seems desirable that there should be added to the "general notice" which precedes the Rules, or to Rule No. 1, a caution to all employes that they are engaged in a hazardous business, which demands extraordinary care on their part to avoid injury to themselves or to their fellows. We do not advocate the broadest extension of this clause, by which some railroad companies endeavor to fix the responsibility for bad breaks, defective couplings, etc., etc., on the employe; yet we know that the employes are in constant need of some reminder of the risks to which they may be exposed by any want of caution; for we hear daily of the death or injury of the oldest men upon any railroad, from forgetfulness of ordinary precautions.

Rule 24 prescribes that firemen, among others, "must provide themselves with proper appliances" for flagging, etc., which suggests how rarely firemen have been prepared, in the past, to do any signaling; and we would like to see a positive rule that on single track the fireman must *always* go ahead with signals, when the train stops out of order, unless he is required to assist the engineer about the engine, this being required as a matter of training. Generally the fireman regards himself as only a stoker, with no more concern for the safety of the train than his shovel.

Rule 25 we would amend to read, "Flags or targets of the proper color must be used by day," and also would add targets to be used as train signals. It is in the experience and observation of every one that there are many objections to flags; their chief advantage over targets being their lightness and portability; but they lose color, or are soiled very quickly; they are frayed by the wind; they fly parallel to the track, and are consequently almost invisible, when the wind blows along the road, or when carried by a train in rapid motion. The painted target, on the contrary, may be washed and so kept bright; it can be placed so as to present its full surface to the view in any wind or at any speed; it fades but little and is not frayed. For signals of caution, at bridges or along the track, or as markers or signals on trains, the target offers many points of superiority over the flag. It seems to us that the target also affords a means of providing a signal to be carried by regular trains to indicate the following of an irregular train, which the Committee has abandoned because the unsatisfactory character of the green and white signals, recommended by the Committee on Train Signals and adopted by the convention, Oct. 9, 1884. We suggest for this purpose targets each 18 in. square, painted in four alternating squares (checkered) blue and white or green and white (if such colors and arrangement are found on trial to be distinctly visible at a distance in the different atmospheric conditions), to be carried on the front of the engine by day, and two green lights suspended over two white lights by night, or illuminated targets could be used at night.

On the great roads this signal is not of much, if of any importance; but on the smaller roads, in hard times, when the utmost economy is required, such a signal is a necessity.

It also seems desirable that there should be an addition to the code of signals, which shall prescribe fixed and different positions for the markers on the rear of the several classes of trains, so that they may be distinguished one from the other at a distance.

Rule 67 is framed in the usual form; but would it not be better if it told the train-men *what to do* when they find no signal displayed where a signal is usually shown? What train-men usually do is simply to *regard it*, and go on. Is the rule intended to require the train to stop, make an examination of the condition of the track, proceed with caution, or what?

This, perhaps, is the only indefinite rule in the whole number.

Rule 101, with regard to sending out men to flag a train stopped between stations, leaves wide latitude to the judgment of the brakeman, and omits cautions as to when it is safe to call in the flagmen.

Rule 105 we would amend as follows: "If a train should part while in motion, train-men must immediately signal the engineer, as provided in Rule No. 64, and use great care, etc."

Probably in other respects the Committee have done the best that can be done to make this most dangerous, as well as most frequent, occurrence as little destructive as possible. Only improved couplings and automatic brakes will remove this greatest cause of damage to property on American railroads. Our records show that the most serious collisions in the whole list, except as to loss of life, are those which result from trains breaking into two or more parts. Good couplings and automatic brakes have completely put an end to these occurrences (they are in no sense accidents) on passenger trains; the same provision upon freight trains will make them equally safe.

Rule 117 does not say *how* enginemen are to signal to others on the opposite track that they are following too closely a preceding train.

As to Rule 114, probably the Rules for Telegraphic Orders will provide further security for the dangerous practice, on single track, of taking down signals which have been carried over a part of a division for a following train. It seems to us safer to run such a train as an extra, without signals on the preceding train, if there is no signal to be provided which will give notice of a wild train.

We would have been better satisfied with these rules if they had provided absolutely for the use of block signals, instead of being compelled to use the expression, "unless some form of block signal is used." There could be no better mode of indicating the tadpole condition of many of our roads than by this expression; for a road is not full-grown into the right to be called a railroad until it has been provided with these elementary appliances for the safe conduct of its business. It is to be hoped that when these rules are revised by some future convention, say ten years hence, the expression we have quoted will be stricken out.

When the body of rules is finally adopted, it is to be hoped that they will be published for use on the railroads so arranged that employes of every class may find those parts of them which they are required to know, placed by themselves. There are certain things in them which a brakeman making his first run should know, but we cannot expect that brakemen, switchmen, etc., will know all the rules, and if they are left to pick out from the whole mass those which concern them particularly, the work of learning them is made unnecessarily hard for them, and, we may be sure, in many cases they will not be completely learned. On all accounts it is desirable that the valuable results of the Committee's labors should be presented to the men in such a way that it will be impossible for any to fail to find what he is required to know, and all that he is required to know, of the whole code.

Dividing the Pennsylvania Railroad Company's Surplus.

There have been for some years complaints by some English holders of Pennsylvania Railroad shares because the company has not divided yearly the whole of its income in excess of prior charges, but has carried a balance to credit of profit and loss, which, in some years, has been very large. These holders wish the company to follow the English practice of dividing the whole surplus, and making all additions to the property by new issues of shares or bonds. One of them is now visiting this country to urge that the "accumulated surplus" be divided, this amounting nominally to \$26,865,000. It is spoken of as if it were so much money in the bank subject to check. In fact it consists of improvements to the property, securities of other companies acquired to strengthen or defend the property, and other investments made to benefit the stockholders' property, whose effect is either to increase their income or to prevent its growing smaller. If this investment actually does increase the income and can be counted upon to do so permanently, it is proper that the shareholders should have additional stock or other securities to represent it. But if it represents "expenditures for defense," like hundreds of millions which American companies have had to expend—the result of which is not to add to profits but to prevent their reduction or annihilation, then the issue of stock to represent it will result simply in reducing the dividends and the market price of the stock—and usually in injury to the credit of the company. It seems hard for English investors to understand the necessity which our companies are under of expending capital simply to protect property, and of limiting dividends for prudential reasons. In 1880 the profits of the Pennsylvania Railroad Company were \$11.10 per share, in 1881 \$11, in 1882 \$10.50, in 1883 \$10.78, in 1884 \$8.54, and \$5.38 last year. Now if the company had divided 10 and 11 per cent. in the prosperous years, it would now be paying interest on the undivided profits which were invested in construction, so that the

income last year would have been less than \$5.38, and perhaps less than \$5. But a more serious and a permanently injurious effect would have been likely to follow, for the payment of dividends so high would have very greatly increased the probability of the construction of a parallel line, or of more than one, and of legislation limiting profits, both of which are dangers which constantly threaten American railroad companies, and which they should constantly guard against. It is doubtful whether it will ever again be possible for a great railroad system to pay very much more than ordinary interest on investments of similar risk for more than a year on two at a time without suffering seriously thereafter. In the case of the Pennsylvania, which suffers losses from thousands of miles of controlled lines in bad times, as it profits by them in good times, a conservative course is especially necessary. When it pays for improvements out of profits, it fortifies itself against embarrassments which are likely to come in unprosperous times, and which those who piloted this company through these stormy times after 1874 are not likely ever to forget. But this is less important than to preserve moderation in dividends as a protection against a future reduction of profits by competing lines and legislation. It should be the ambition of this company to prepare to do the transportation of a vast part of the field which it covers so cheaply that no one else will be tempted to enter the field. It can do this only by keeping down its capital account and making moderate dividends, and when it so chances that it earns a profit of \$10, or \$12 per share, it can use part of it better by insuring, as it were, permanency in moderate dividends than by dividing the whole at the time.

It is natural, probably, that English investors should not generally appreciate the circumstances which make such a policy wise in this country, because they are unlike those which affect their companies; but Mr. John Taylor, who comes here to urge the payment of large dividends by the Pennsylvania, has had an "object lesson" on a large scale that should have instructed him. He is the same London stock broker, we understand, who urged successfully the issue of the Reading "deferred bonds" and other junior securities of that ill-fated company, which made it possible to pay dividends for a time, and then helped to plunge the company into that gulf of deep despair, out of which it is now trying to flounder.

We are pleased to learn, as we go to press, that the interest of the forthcoming (April, 1887) brake tests will be still further increased, as we surmised last week, by the entrance of an electric brake to the competition, an order having been received by the Chicago, Burlington & Quincy to fit up a train of 25 cars. It does not necessarily follow that the cars will actually be fitted up, for after the experience at the late tests with half prepared and wholly untested trains we take it as certain that no train will be fitted up—or certainly none under the direction of the Chairman of the Brake Committee—which is not shown to be in condition to do reasonably efficient and safe service; but a good deal of experimenting in a small way has now been done with electric brakes, and while it will be extraordinary if important defects of detail do not develop in any one entered for the test, in the present state of experimental knowledge on the subject, it may reasonably be hoped that it will be in shape to be permitted to enter, and will then give some rough indication of what can and cannot be hoped for in that direction.

Electric brakes have certainly one most desirable possibility, which will be especially important for freight brakes. If efficient at all they are instantaneous in their action, thus saving not only the great loss of time in getting the brakes fully on after they have been applied, but also, there is reason to believe, all or nearly all the shock which now results from an "emergency" application of any power brake. Close coupling will very greatly reduce the shock, as was proved at Burlington, but considerable shock still remains, and it is due, not to the force of the brakes directly, but to the fact that they go on in one part of the train before the other. As respects the loss of time in getting the best power brakes fully on, the diagrams in this and our last issue give full evidence, even after due allowance is made for the fact that no brake is or can be as efficient when first applied at high speeds as after the speed is much reduced, even if the pressure on the brake shoes be the same, because the "co-efficient of friction," or ratio of retardation to pressure, is much higher at very low speeds.

But while it will be interesting to see if electricity holds out any reasonable promise of saving this loss, and while it is very important to do so if it is practically possible without more than corresponding dis-

advantages, it is well to remember that, as compared with the loss of time which now takes place with the most efficient hand brakes, it is a trifling matter indeed; the advantage of approved power brakes over hand work, even with the aid of driver brakes, being so great that, even if better results do not prove to be reasonably possible, there will be no reason to mourn greatly. If we wait for ideal perfection we may have to wait a long time—and then not get it.

This makes the eighth competitor to enter for the tests, if this entry finally remains good. Some curtailment of the multifarious tests of the last series will, therefore, be almost essential.

September Accidents.

Our record of train accidents in September, given on another page, contains notes of 58 collisions, 69 derailments and 8 other accidents; a total of 135 accidents, in which 42 persons were killed and 135 injured.

As compared with September, 1885, there was an increase of 44 accidents, of 17 killed, and of 50 injured, a great increase in all respects.

These accidents may be classed as to their nature and causes as follows:

COLLISIONS:	
Rear.....	38
Butting.....	17
Crossing.....	3
DERAILMENTS:	69
Broken rail.....	1
Broken frog.....	3
Broken bridge.....	2
Spreading of rails.....	7
Broken wheel.....	3
Broken axle.....	10
Broken truck.....	1
Broken draw-head.....	1
Broken brake beam.....	3
Cattle on track.....	3
Land-slide.....	2
Wash out.....	2
Misplaced switch.....	15
Open draw.....	1
Rail removed purposely.....	1
Malicious obstruction.....	1
Purposely misplaced switch.....	2
Unexplained.....	11
OTHER ACCIDENTS:	8
Boiler explosions.....	2
Steam chest burst.....	1
Broken parallel rod.....	4
Car burned while running.....	1

Total number of accidents..... 135
Eight collisions were caused by trains breaking in two; five by mistakes in orders or failure to obey them; four by failure to use signals properly; three by misplaced switches and two by fog.

Of the two broken bridges one was a small wooden one; the other was a new iron span, which was probably knocked down by a derailed car striking the end post.

A general classification of these accidents is made as follows:

	Collisions.	Derailments.	Other.	Total.
Defects of road.....	13	..	..	13
Defects of equipment.....	8	18	7	33
Negligence in operating.....	48	16	..	64
Unforeseen obstructions.....	2	7	1	10
Maliciously caused.....	..	4	..	4
Unexplained.....	..	11	..	11
Total.....	58	69	8	135

Negligence in operating is thus charged with 47.4 per cent. of the total number of accidents; defects of equipment with 24.4, and defects of road with 9.6 per cent.

A division according to classes of trains and accidents is as follows:

	Collisions.	Derailments.	Other.	Total.
To passenger trains.....	1	19	6	26
To a pass. and a freight.....	23	..	..	23
To freight trains.....	34	50	2	86
Total.....	58	69	8	135

This shows accidents to a total of 193 trains, of which 50 (25.9 per cent.) were passenger trains and 143 (74.1 per cent.) were freight trains.

Of the total number of accidents 72 are recorded as happening in daylight and 63 at night. This is an unusually large proportion of night accidents.

The number of casualties resulting from the different classes of accidents was as follows:

	Killed.	Injured.	Total.
In 58 collisions.....	28	81	109
In 69 derailments.....	14	59	73
In 8 other accidents.....	..	8	8
Total, 135 accidents.....	42	148	190

Eighteen accidents in all—7 collisions and 11 derailments—caused the death of one or more persons each; 41 in all—24 collisions, 13 derailments and 4 other accidents—caused injury, but not death. This leaves 76 accidents—27 collisions, 45 derailments and 4 others—being 56.3 per cent. of the whole number, in which there was no injury to persons serious enough for record.

The killed and injured persons were divided as follows:

	Killed.	Injured.	Total.
Employees.....	21	68	89
Other persons.....	21	80	101
Total.....	42	148	190
Per cent. of employees.....	50.0	45.9	46.8

While employees furnish by far the greater portion of the casualties in the minor accidents, a single accident to a passenger train may change the proportions altogether, so that no general average can be arrived at, even by taking a long series of months.

The month shows the largest number of accidents recorded in any month for over a year. No special cause appears for this increase in the conditions of the weather or otherwise. It is, perhaps, a repetition of what has been noted before, that an increased number of accidents has always appeared in

those years when railroad building was active. The increase in this and the preceding months has been largely in accidents of management, and the number of misplaced switches and similar accidents due to carelessness is a very discouraging feature of the record.

The total number of accidents in the first, second and third quarters of this and last years, with the number of broken rails, were:

	1886.	1885.
	Total. Broken rails. P. c.	Total. Broken rails. P. c.
First quarter.....	273 23 8.4	447 67 15.0
Second quarter.....	234 10 4.3	218 8 3.6
Third quarter.....	341 4 1.2	258 8 3.1
Total.....	848 37 4.4	924 83 9.0

The worst accident contained in the month's record is the butting collision at Silver Lake, which has already been commented on at some length.

For the year ending with September the record is as follows:

	Accidents.	Killed.	Injured.
October.....	123	31	124
November.....	96	19	118
December.....	74	31	153
January.....	94	40	90
February.....	98	21	157
March.....	81	49	131
April.....	66	23	105
May.....	93	23	170
June.....	75	33	86
July.....	91	23	88
August.....	115	31	117
September.....	135	42	148
Total.....	1,141	366	1,497
Total, same months, 1884-85.....	1,230	331	1,534
" " 1883-84.....	1,293	388	1,933
" " 1882-83.....	1,641	476	1,801

The yearly average for the four years was 1,326 accidents, 390 killed and 1,691 hurt. The monthly average for last year was 95 accidents, 31 killed and 125 injured.

The averages per day were, for the month, 4.50 accidents, 1.40 killed and 4.93 hurt; for the year, 3.13 accidents, 1.00 killed and 4.10 injured.

The average casualties per accident for the month were 0.311 killed and 1.096 hurt; for the year they were 0.321 killed and 1.312 injured.

The month was thus considerably above the average of the year in number of accidents and casualties, but it was somewhat below it in the number of fatal accidents.

Grain Exports.

The breadstuffs exports in September were not only much greater this year than last; but they were also the largest since 1882, when, though the corn exports were extremely small, the wheat exports were enormous. For six years the exports of wheat and flour, of corn, and of all grains, in bushels and their values, have been in September:

Year.	Wheat and flour.	Corn.	All grains.	Value.
1881.....	13,122,626	4,095,111	17,217,737	\$19,447,433
1882.....	20,988,559	623,597	21,612,156	24,662,001
1883.....	11,305,765	4,707,029	16,012,794	16,192,980
1884.....	13,026,344	1,184,696	14,211,040	13,631,358
1885.....	6,316,145	3,900,992	10,217,137	9,007,713
1886.....	14,260,175	2,713,118	16,973,293	14,282,528

There were very light crops of wheat in 1881 and 1885, and very heavy ones in 1882 and 1884. The situation with regard to the corn crop is much as it was in 1881, except that the crop then was much lighter than now; but there was a decrease from 1,717 millions in 1880 to 1,194 in 1881, and a decrease from 1,936 in 1885 to 1,650 millions in 1886. The knowledge that the crop would be 523 millions less than the year before did not prevent the export of 4,095,000 bushels in September, 1881; but the knowledge that it would be 286 millions less this year than last has brought down the September exports to 2,713,000 bushels.

The value of the September exports was considerably less this year than in 1883, when the quantity was smaller, and the quantity of the high-priced wheat and flour one-fifth smaller.

The course of exports in successive months this year and last is shown below, in thousands of bushels and in dollars:

	Flour and wheat.	Corn.	All grains.	Value.
Jan.....	\$6,676	\$6,074	\$12,750	\$9,407,315
Feb.....	7,637	6,185	13,822	10,104,931
March.....	7,762	8,032	15,794	11,137,836
April.....	8,512	7,694	16,206	11,959,853
May.....	11,490	5,951	17,441	13,548,543
June.....	12,709	4,948	17,657	13,702,993
July.....	10,920	3,383	14,303	11,570,649
August.....	15,759	1,435	17,194	16,116,881
September.....	14,260	2,713	16,973	14,282,528

We see that the exports were quite as large before harvest, taking all grains together, as they have been since, but there has been a decrease in corn and an increase in wheat, as it became probable that the corn crop would be short. Still the wheat and flour exports were exceptionally large in April, May and June, they having been in successive months for six years in millions of bushels:

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1881.....	11.6	10.1	14.7	13.6	12.9	12.8	11.6	16.8	13.1
1882.....	8.9	7.7	8.5	7.1	7.2	6.4	12.7	23.9	20.6
1883.....	11.2	9.7	9.8	7.1	5.6	6.3	5.9	12.7	11.3
1884.....	8.9	6.8	7.2	9.4	7.7	7.2	9.7	15.8	13.0
1885.....	15.5	9.2	7.3	10.1	8.2	6.5	6.3	5.7	6.3
1886.....	6.7	7.6	7.8	8.5	11.5	12.7	10.9	15.7	13.0

Usually the wheat and flour exports are larger in the first three months than in the second three months of the year, but this year they were much larger in the second quarter, the grain which had been held back going forward then in quantities greater than after the greatest crops. The wheat and flour exports in successive quarters for the six years, in millions of bushels have been:

Quarter.	1881.	1882.	1883.	1884.	1885.	1886.
First.....	36.4	25.1	30.7	22.9	32.0	22.1
Second.....	39.3	20.7	19.0	24.3	24.8	32.7
Third.....	41.5	57.2	29.9	38.5	18.3	40.9

In 1881 the exports were 2,800,000 bushels greater in the second than in the first quarter, and in 1884 1,400,000 greater, but this year no less than 10,600,000 greater, while in the other years the exports were less in the second quarter by 4.4, 11.7 and 7.2 millions respectively. It was the surplus

of 1884 rather than that of 1885 which we sent away just before the last harvest.

The third quarter the exports are determined by the abundance of the new crop and the intensity of the foreign demand. In 1882, for instance, following the poorest of crops, the world's supply had fallen very low by harvest time, and the wheat was taken about as fast as it could be got ready for market. When it happens that only the spring wheat is a good crop, large exports cannot be made in the third quarter, however, because little of it can be forwarded in time to export before September. The exports this year in the third quarter were more than twice as great as last year, and a third more than in 1883, but they were a little less than in 1881, when the crop was but little more than last year and very much smaller than for two years previous and 28 per cent. less than in 1882, when the crop was about 50 millions (11 per cent.) more than this year. Now the foreign demand this year cannot be said to have been pressing, otherwise prices would have been higher, but it has absorbed a very large amount of our wheat, the exports for the six months ending with September having been larger this year than in any other since 1882 and nearly as large as then, namely, 73.6 millions this year, against 80.8 in 1881 and 77.9 in 1882.

We have thus within the last six months disposed of an unusually large part of our accumulated surplus and moderate new crop of wheat.

The corn exports are not likely to be small in August and September unless either the crop of the previous year was light, leaving little to export, or that of the same year promises poorly, making it necessary to keep most of the surplus old corn for home consumption. In 1882 both these causes combined, and the corn exports in the three months, July to September, which had been 21,585,000 bushels in 1881, fell to 1,238,000. Formerly not a great deal of corn was exported in winter, even if the crop was large, but it was held to be forwarded by lake and canal, but railroad rates of late years permit the corn to move at all times.

The corn exports in successive quarters for the last six years have been, in thousands of bushels:

Quarter.	1881.	1882.	1883.	1884.	1885.	1886.
First.....	15,992	6,665	17,670	9,127	22,143	26,291
Second.....	23,522	3,516	17,284	9,800	15,321	18,564
Third.....	21,585	1,238	15,320	5,616	10,839	7,431
9 mos.....	61,099	11,419	50,274	24,543	48,903	46,286

The crops of the years from which these exports were made were, in thousands of bushels:

Year.	1880.	1881.	1882.	1883.	1884.	1885.
	1,717,400	1,194,300	1,617,000	1,551,100	1,795,500	1,936,200

In 1881 the failure of the crop was known in August to be inevitable, and that it would be much lighter than it is this year, yet in the July-September quarter the exports were nearly three times as great as they were this year, and this year they were but half as great as in 1883, after a crop 319 millions less than last year's and before one 100 millions less than this year's. In spite of two large crops, which should have left a great surplus, the prospect of a crop above the average of the four years from 1880 to 1883 has led to the holding back of corn to such an extent as to warrant the belief that the consumption of corn has increased greatly since the large crops of 1879 and 1880 left us with a great surplus for export, and that the consumption is much more than the government reports of live stock will account for, these reports showing a decrease in hogs and very little increase in cattle, except in the range country, where corn is not grown. A more general feeding of these range cattle before marketing may account for some of this increased consumption.

On the whole, the wheat and flour exports are larger than the statistics of crops would lead us to expect, and the exports of corn smaller. From a crop of 1,717 million bushels in 1880 we were able to spare 61 millions in the first nine months of 1881; from a crop of 1,936 millions last year we have spared but 46 millions this year, and on the prospect of a crop which is certainly much above the consumption previous to 1885 we are hoarding our old corn as if we could not spare any.

The values of the exports of grain and flour for the nine months ending with September, in each of the last six years, have been:

Year.	Value.	Year.	Value.
1881.....	\$177,452,638	1884.....	\$110,618,533
1882.....	124,937,899	1885.....	102,190,798
1883.....	130,430,436	1886.....	110,828,599

The value this year is 8½ per cent. more than last year, and nearly the same as in 1884, but is very much less than in previous years—very nearly \$100,000,000 less than in 1880.

New York Grain Receipts in September.

The grain receipts at New York, including flour, in September for ten successive years have been, in bushels:

	By rail.	By water.	Total.
1877.....	5,107,004	7,672,101	12,779,105
1878.....	8,024,941	10,220,967	18,245,908
1879.....	7,730,632	10,521,236	18,251,868
1880.....	5,895,086	11,083,169	16,978,255
1881.....	9,519,501	5,474,498	14,993,999
1882.....	8,714,015	3,728,438	12,442,453
1883.....	8,913,487	7,798,931	16,712,418
1884.....	7,516,138	7,064,782	14,580,920
1885.....	9,142,396	5,715,085	14,857,481
1886.....	8,775,550	8,351,248	17,126,798

Thus the total receipts of the month were larger this year than in any other except 1878 and 1879, and were 15 per cent. more than last year and 17½ per cent. more than in 1884.

In spite of rates fully twice as high as those ruling last year, the receipts by rail this year were but a little (4 per cent.) less; in 1881, when a 15-cent rate prevailed, the rail receipts were 8½ per cent. more than this year, and in 1883, when the nominal rates were the same as now, but there was a great deal of cutting (resulting in the Erie's getting an extraordinarily large share of the business), they were 1½ per

cent. more than this year. In all years but these three the New York rail grain receipts were less than this year.

The water receipts are nearly all by canal, the largest by coasting vessels having been but 375,000 bushels. These were larger this year than in any other since 1880, but much less than in 1878, 1879 or 1880. The gain over last year, however, was 46 per cent., and the canal boats have had all they could do.

The receipts by the several railroads in September were more nearly in the usual proportions than in August, when the New York Central and the Pennsylvania had an unusually large part of the business, and the two together brought nearly three-fifths of the rail grain.

The lines which have a much larger share than in August are the Lackawanna and the West Shore. The Lehigh Valley had a smaller share than in most other months since it fairly began the business. In times like these, when the railroads which carry the larger part of the business have all they can conveniently handle, the other lines, which usually carry but little, may gain proportionally more than the roads which carry most.

In September the total rail receipts were the largest in any month of this year since March; but the receipts by the Erie were less than in May or June, those by the Pennsylvania less than in August, while those of the Lackawanna were much larger than in any other month since March, and the West Shore's much larger than in any other month of the year, and twice as great as in August. Under these circumstances larger receipts by the Lehigh Valley were to be expected. For the eight months ending with August the three new lines from New York to Buffalo had brought 27.7 per cent. of the receipts of grain at New York; in September, 30.5 per cent.

For the nine months ending with September the New York receipts of grain and flour have been, in millions of bushels: 1877. 1878. 1879. 1880. 1881. 1882. 1883. 1884. 1885. 1886. 59.3 107.7 112.7 121.7 109.9 75.4 90.3 77.3 63.2 92.9

Thus the receipts this year were very nearly as large as last year and larger than in any of the three years previous, but much less than in any of the four years from 1878 to 1881. But this year has been made up of a very bad and a very good part. In the first half of the year the receipts were very light, while in the last three months they have been heavy. Thus for seven years the receipts in the six months to June 30 and the three months to Sept. 30 have been, in millions of bushels:

1879. 1880. 1881. 1882. 1883. 1884. 1885. 1886. 6 mos. to June 30. 61.4 69.0 62.3 41.1 52.9 43.3 57.3 52.5 3 mos. to Sept. 30. 51.3 55.7 47.6 34.3 37.7 35.0 35.9 40.4

Thus while the receipts in the first half of this year were less than in any other in the table except 1882 and 1884, those of the three months ending with September were much larger than in any other year since 1881.

Comparing Weekly Earnings of Northwestern Railroads.

The fact that some of the railroads northwest of Chicago had smaller earnings this year than last in the third week of October, while for two months or more previous they had had decidedly larger earnings, has been interpreted as indicating a change for the worse in their business. But no comparison for so short a time as a week, and of two years only, has much significance. The earnings of these railroads are usually light in midsummer and increase when the crops begin to move, and are at their maximum when the crop movement is at its height. It is not the carrying of the crops alone that occasions the large earnings, but the general movement of west-bound freight and of passengers is largest about at the same time as the largest crop movement, which is really at the bottom of it all on these railroads. Now, the chief crop marketed on the lines northwest of Chicago is spring wheat. Sometimes it is marketed early and sometimes late. An early movement as compared with an average movement is shown in an increase of earnings in August and the early weeks of September; a late movement increases the earnings in the latter part of September, October and November. As we have shown heretofore, the movement was unusually early this year, but was late rather than early last year. We have now reached the period when the movement was large last year and have probably passed the time of the maximum movement this year. Thus the receipts of wheat at Chicago, Milwaukee and Duluth in successive weeks for three years have been, in bushels:

Week to	1884.	1885.	1886.
Aug. 7.....	1,335,238	325,191	887,402
" 14.....	1,070,613	397,516	1,144,275
Sep. 4.....	1,036,868	587,608	1,066,147
" 11.....	1,771,341	1,265,778	1,856,385
" 18.....	2,026,991	947,667	2,400,291
" 25.....	1,672,194	1,067,699	2,693,836
Oct. 2.....	1,769,517	1,031,674	1,971,408
" 9.....	1,801,587	1,137,136	1,957,795
" 16.....	2,004,252	1,404,625	1,872,426
" 23.....	2,494,803	1,490,383	.....
" 30.....	2,372,317	1,428,311	.....
Nov. 6.....	2,013,489	1,125,143	.....
" 13.....	2,253,071	1,107,597	.....
" 20.....	2,071,784	1,064,194	.....
" 27.....	1,982,111	1,491,625	.....
Dec. 4.....	2,545,144	1,785,040	.....
" 11.....	2,488,477	1,443,985	.....

The receipts here given in August, 1884, were mostly at Chicago, and the Chicago receipts then must have been largely and perhaps mostly winter wheat. At all events, we see that the maximum receipts of these spring wheat markets were in October, and later in 1884 and 1885, while this year, so far, they have been in September.

The crop of spring wheat is not larger, but somewhat smaller this year than last, and as in the two months to Oct. 16, 15,843,793 bushels were received at these markets this year, against 8,224,894 last year, it is not reasonable to expect the October and November receipts to be larger than the September receipts this year, as they were last year and the year before, and as they usually are. They remain large,

but have been decreasing somewhat since the week to Sept. 18.

It may be said that after all the receipts are still larger than last year at this time; but we say again that the large wheat receipts make but a small part of the large earnings, but that the early marketing of the crops causes an early "fall trade," which does make the large earnings. This is further illustrated by the course of earnings on the two largest systems northwest of Chicago, which are here given per day in successive weeks, because the fourth week of the month contains nine or ten days, and cannot properly be compared with other weeks of the same year, which is the main point here:

Average Daily Earnings in Successive Weeks.			
C. M. & St. P.		Chic. & N. W.	
1884.	1885.	1884.	1885.
Aug. 7.....	\$58,400	\$58,106	\$60,143
" 14.....	55,652	54,105	58,286
" 21.....	57,649	50,777	63,570
" 28.....	65,344	72,506	76,200
Sep. 7.....	67,878	70,007	79,143
" 14.....	67,347	68,883	81,250
" 21.....	74,007	75,008	82,000
" 28.....	81,776	86,221	95,222
Oct. 7.....	76,239	84,337	89,000
" 14.....	79,071	89,209	90,143
" 21.....	80,302	90,991	83,714
" 28.....	86,951	104,024	89,614
Nov. 7.....	79,035	86,714	65,157
" 14.....	80,006	90,570	66,030
" 21.....	78,434	90,714	69,430
" 28.....	71,830	84,667	65,800

We see here that while there has been in all years an increase in the weekly earnings from August to September the increase was unusually early and unusually large this year on both these railroads, like the wheat receipts. Their earnings in the first week of September were larger than in the first week of August by:

C. M. & St. P.			Chicago & N. W.		
1884.	1885.	1886.	1884.	1885.	1886.
\$9,478	\$13,901	\$19,000	\$12,128	\$8,043	\$19,074

While the gain in the first week of October over the first week of September was:

C. M. & St. P.			C. & N. W.		
1884.	1885.	1886.	1884.	1885.	1886.
\$11,361	\$15,454	\$7,750	\$2,946	\$19,813	\$9,000

Thus while the gain from August to September was unusually large this year, the gain from September to October was unusually small, leaving the increase in the first week of October over the first week of August more nearly uniform, and nearly the same as last year, it having been:

C. M. & St. P.			C. & N. W.		
1884.	1885.	1886.	1884.	1885.	1886.
\$20,839	\$28,231	\$28,857	\$15,071	\$29,443	\$26,914

It is not a sign of change for the worse, then, when lines such as these earn a little less than last year at this time. Railroads have their harvest seasons, and the season was unusually early this year, and having been gathered (largely) cannot be gathered again. That there is generally a greater activity in business now than last year is unquestionable; but the part which the crop movement plays in the matter will very likely be less important this year now for a few weeks than it was a year ago, when the largest spring wheat movement was at the end of November and the beginning of December.

In quoting the results of our records of the Burlington close coupling tests *The Engineer* remarks:

"The general results seem to establish the conclusion that the loose slack of open couplings is of no advantage in starting a long and heavy train, and that the draw-bar springs give all the slack that is needed. This is opposed to the results of English experience, which show that slack in the couplings is essential to the starting of heavy trains. How much slack is an open question."

In one sense it is opposed to the results of American experience likewise, for the all but universal impression has been that the slack played a very important part in starting heavy trains, and there have even been some imperfect records tending to prove it. The English use a great deal of slack in freight trains, far more than here, but certainly they do not start as heavy trains as here by a large percentage, so far as can be judged from the fragmentary evidence available, and therefore the "results of English experience" have an even slimmer basis of solid fact to rest on than the previous supposed results of American experience.

The Chicago, Burlington & Quincy is laying down large quantities of burnt clay ballast on its Iowa lines, having put in some 40 miles in ten-mile sections, besides a large quantity during the latter part of this season. It is said to give excellent results, and it is certainly not very expensive nor troublesome to burn, when the clay is at hand and other ballasting material is not. The Union Pacific, the Chicago, St. Paul, Minneapolis & Omaha, and the Hannibal & St. Joseph roads have also used considerable quantities of it.

To prepare the ballast, the soil is stripped off for a length of 300 to 1,000 ft.—whatever length of train for loading is desired—and a fire started with kindling. On this a mixture of slack and pea coal is sprinkled, then a thin layer of clay, 2 to 3 in. thick, then another good sprinkling of coal, then more clay and so on indefinitely, in the proportion of about one ton of coal to 8 cubic yards of ballast. When fully burned the pile is about 8 ft. high and 20 to 30 ft. wide and from four to five months are consumed in burning it, a small gang of men being on hand constantly to feed the pile. One gang will ordinarily burn from 24,000 to 25,000 cubic yards at once, and its cost on the cars at the pits is about 80 cents per cubic yard. After the first rain the ballast is not dusty and it does not crumble.

The Sibley College (engineering school) of Cornell University, which is now under the direction of Prof. R. H. Thurston, has engaged a number of eminent practicing engineers to give each a lecture, usually on some specialty of the engineer during the current college year. Those already engaged

are Eckley B. Coxe, of Drifton, Penn.; Dr. Charles E. Emery, of New York City; John W. Hill, of Cincinnati; J. M. Allen, of Hartford, Conn.; Dr. E. D. Leavitt, Jr., of Boston; J. C. Bayles, of New York City; H. R. Towne, of Stamford, Conn.; C. J. H. Woodbury, of Boston; O. Chanut, of Kansas City, Mo.; Abram S. Hewitt, of New York City; Charles T. Porter, of New York City; Dr. D. M. Greene, of Troy.

Other eminent engineers who have been invited will probably lecture, but are not able to say that their engagements will permit it this year.

The Northwestern receipts of grain are smaller now than in August and September, but they are not very small, and show no sign of decreasing as yet, having been, for four weeks, in bushels:

Week ending—			
Sep. 25.	Oct. 2.	Oct. 9.	Oct. 16.
6,836,794	7,194,400	7,710,840	7,076,942

The average for the six weeks ending Sept. 18 was 8,636,000 bushels per week. For the four weeks ending Oct. 16 the receipts for five successive years have been:

1882.	1883.	1884.	1885.	1886.
22,114,730	31,977,979	31,806,881	27,598,975	29,408,976

Considering how much larger than usual the receipts were in August and the first half of September, the receipts for the four weeks above have been larger rather than smaller than was to be expected.

The wheat receipts continue to fall off at Duluth, but they increase at Chicago and Milwaukee. In the week to Oct. 16 Chicago had larger receipts than in any other week of the year except the last of July and the first of August, while Milwaukee had larger receipts than in any other week of the year or any week of last year. After five successive weeks of receipts of more than a million bushels, Duluth in this week to Oct. 16 fell to 829,026, which, however, was more than any other market received, and was equalled at Duluth last year in only two weeks, and in but three in 1884.

In the nine weeks ending Oct. 16 Duluth received 9,346,862 bushels of wheat this year, against 4,107,477 last year in the same time. Last year its receipts for the whole year after the middle of August—20 weeks—were but 10,543,857 bushels, not one-seventh more than in the eight weeks this year, in which the total wheat receipts of the eight Northwestern markets were 22,814,412 bushels, so that Duluth received 40 per cent. of the whole. While its receipts have been so very much greater than last year, all reports indicate that the quantity of wheat raised in Northern Minnesota and Dakota, from which heretofore nearly all the Duluth receipts have come, were somewhat less than last year—certainly not greater.

The lake vessels disregard the "short haul" principle. Recent engagements for shipments of coal from Buffalo were \$1 per ton to Chicago, 85 cents to Marquette, and 65 cents to Duluth—all on the same day.

A statement of the working expenses of the Chicago, Milwaukee & St. Paul Railway in the first half of this year shows that they were decidedly larger than last year, the earnings and expenses for the half-year having been:

	1884.	1885.	1886.
Gross earnings.....	\$10,427,193	\$10,611,939	\$10,637,876
Expenses.....	6,256,316	6,701,245	7,137,165

Net earnings .. \$4,170,877 \$3,910,714 \$3,500,711
The gross earnings have been very uniform throughout the three years, but the working expenses (including taxes) increased 7 per cent. from 1884 to 1885, and again 6¼ per cent. from 1885 to 1886.

Some disappointment has been expressed at this, it having been assumed that because the gross earnings had been maintained the net earnings would be also; whereas the net earnings this year are 10½ per cent. less than last year and 16 per cent. less than in 1884. It is only what should have been expected, however, when the gross earnings failed to increase. There have been some additions to the road in these years, which cannot be worked without expense; but more than that, the company within the past six or eight years has added very largely to its mileage, and the new structures cost little to maintain for the first few years. Time enough has elapsed now to make something like average repairs and renewals necessary, and the indications are that they are being made as needed. The working expenses in 1884 were just 60 per cent. of the gross earnings, while this year they were 67 per cent.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Chicago, Milwaukee & St. Paul—The *Hastings & Dakota Division* is extended northwest to Edgeley, Dak., 16½ miles. The *Armour Branch* is completed from Tripp, Dak., to Armour, 20 miles.

Chicago & Northwestern—The *Redfield Branch* is extended from Redfield, Dak., westward to Faulkton, 32½ miles.

Grand Rapids & Indiana—Track laid on the *Muskegon Branch* from Grand Rapids, Mich., west by north to Berlin, 12 miles, and from Muskegon east by south to Ravenna, 18 miles.

G. I. Colorado & Santa Fe—The *Dallas Branch* is extended northeast to Celeste, Tex., 14 miles.

Manmoth Cave—Track laid from Glasgow Junction, Ky., north by west to the Mammoth Cave, 9 miles.

Toledo, Ann Arbor & North Michigan—Extended from Durand, Mich., to Owosso, 17 miles.

Sheffield & Birmingham—Extended southward to Russellville, Ala., 5 miles.

This is a total of 144 miles on 8 lines, making 4,698

miles reported so far this year. The new track reported to the corresponding date for 15 years has been:

Miles.	Miles.	Miles.
1886.....4,698	1881.....5,763	1876.....1,913
1885.....2,130	1880.....4,614	1875.....1,080
1884.....3,030	1879.....2,859	1874.....1,524
1883.....5,188	1878.....1,724	1873.....3,130
1882.....8,446	1877.....1,824	1872.....6,106

This statement covers main track only, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS.

The *Iron Review and Railway Magazine* is a monthly journal, formed by the consolidation of the *Iron Review* and the *Railway Magazine*. It is published by C. L. Sherrill & Co. at Buffalo, N. Y., Messrs. C. W. Moulton and George E. Allen being associate editors.

The Prevention of Fire. By Wm. Paul Gerhard, C.E., Consulting Engineer for Sanitary Works.

The author wishes it to be known that copies of this pamphlet can be obtained of him at 60 cents each at No. 6 Astor place, New York. A very large proportion of the fires which occur are due to neglect of the more ordinary precautions, which this brief paper notes, from thoughtlessness or ignorance, in building or at a later period. While we have known a great many more pages to be furnished for the money, any one having many structures in charge must be well informed if he cannot get 60 cents worth of information out of it.

The Iron Trade of the United Kingdom. By Sir Lowthian Bell, Bart., British Iron Trade Association.

This volume of 168 pages is very full of statistics of the iron trade of the whole world. Its general conclusions are that the raw materials are mined and converted into pig or wrought iron and steel as cheaply in England as in any continental country; that fuel, ore and limestone are transported by rail somewhat cheaper in England than on the continent, but that the reverse is the case as respects the metallic products; that in machinery and even iron ship-building the work is "as well and more cheaply done" abroad than in Great Britain, despite the large proportion of that trade in British hands; that the "magnificent distances" of the Northern United States "renders it impossible that the iron trade can ever become of a largely exporting character," especially as the disadvantage is now increased by the very high price of labor, and that "to what extent the Southern states may be able to compete with Europe in an export trade time only will show." Not all of the conclusions of the volume naturally will be accepted in this country, but for that very reason it is the more interesting reading.

TECHNICAL.

Locomotive Building.

The Union Pacific Co. has let contracts for 25 freight and 15 shifting engines, the Brooks Locomotive Works in Dunkirk, N. Y., taking the contract.

The New York Central & Hudson River shops have just completed three new passenger engines for the road. One was built at West Albany, one at Syracuse and one at Buffalo.

The Old Colony Railroad shops in Boston have just completed a new passenger locomotive for the road.

The Car Shops.

The Litchfield Car Co. in Litchfield, Ill., has a contract for 500 box cars for the Cleveland, Columbus, Cincinnati & Indianapolis road.

The St. Charles Car Co. in St. Charles, Mo., is completing an order for passenger cars for the Atchison, Topeka & Santa Fe. These are the first passenger cars built in these shops, and are very handsomely finished in mahogany. The company has taken a contract for 125 additional freight cars for the Colorado Midland road.

The Erie Car Works in Erie, Pa., are building 100 tank cars for the Standard Oil Co.

The Wason Manufacturing Co. in Brightwood (Springfield), Mass., is completing an order for 5 passenger and 10 excursion cars for the Annapolis & Baltimore Short Line. The company has nearly completed 2 sleeping cars for the Autofogata Railroad in Chili, South America, and 10 freight cars for the Southern Railroad in Chili.

The Buffalo Car Manufacturing Co., in Buffalo, N. Y., has just completed orders for refrigerator cars for the Erie and the Merchants' Dispatch. The shops are now busy on 500 hopper-bottom gondolas for the New York, Lake Erie & Western and 50 box cars for the Ogdensburg & Lake Champlain.

Bridge Notes.

During the first 15 days of the month the St. Louis Bridge & Iron Co. took contracts for iron highway bridges for public roads, ranging from 80 to 140-ft. in length, as follows: For three bridges near Mexico, Mo.; for two in Callaway County, near Cedar City, Mo.; for a 140-ft. bridge for Broadway street, over Cahokia Creek, in East St. Louis. The last named structure will have a 24-ft. roadway and an 8-ft. sidewalk.—*St. Louis Age of Steel.*

The King Bridge Co., of Cleveland, is now engaged in foundation work and the preparation of material for the immense iron Central Viaduct, which it has contracted to build in the city named. This immense structure is to extend from Hill street, on the north, to Abbey street, on the south, across the Cuyahoga River and flats, and Walworth Run, connecting the city proper with what is known as the South Side. Its length will be 3,920 ft. with a total width of nearly 60 ft. The draw-span over the Cuyahoga River will be 236.5 ft. in length. The viaduct will average about 100 ft. in height above the flats, and it will cross the Cleveland & Canton, the Nickel Plate, the Bee Line, the Lake Shore, the New York, Pennsylvania & Ohio, and the Valley tracks. It will cross the Nickel Plate viaduct at a height of 27 ft. There will be 63 spans in the structure resting upon masonry piers. The estimated weight of the iron to be used in it is 4,500 tons. The angles and plates are made by the Cleveland Rolling Mill Co., and the structural shapes by the Union Rolling Mill Co. It is intended for street car traffic, and is expected to be finished in March, 1888.—*Cleveland (O.) Iron Trade Review.*

The H. S. Hopkins Bridge Co., in St. Louis, is building a draw-span 250 ft. long for the San Antonio & Aransas road at Aransas Pass, Texas.

The Iron Piling Co. has been incorporated at Chicago with a capital stock of \$1,200,000. The object of the company is to manufacture iron substructures for bridges, elevated rail-

roads, etc. The incorporators are Phineas Pease, Charles Fitzsimons and Wm. E. Rollo.

Iron and Steel.

Henry Clay Furnace at Reading, Pa., has gone out of blast for repairs.

Martel Furnace at St. Ignace, Mich., went into blast recently. It is a charcoal furnace.

The Laclede Rolling Mill in St. Louis will be started up about Nov. 1. Only the plate and sheet trains will be run at first.

J. P. Witherow, of Pittsburgh, closed a contract last week with the Chicago Steel Co. for a new steel plant to be erected at Hammond, Ind. The plant when completed will have a capacity of 150 tons per day, and its product will be steel nails, car axles and steel billets. The blooming and plate trains will be furnished by J. L. Lewis, of Pittsburgh, the furnace castings by the Altoona Car Works, of Altoona, Pa., and four regenerative gas furnaces by M. V. Smith, Consulting Engineer of the company, who has his office in the Bissell Block, Pittsburgh. The plant will cost \$157,000, and will be completed about Feb. 15, 1887.—*American Manufacturer.*

Orbiston and Fleetwood furnaces in the Hocking Valley region in Ohio, which have been idle since the great strike, are to go into blast soon.

Manufacturing and Business.

The Edwards Electric Light Co. has been organized at Richmond, Ind., with \$2,000,000 capital stock, to make electric headlights of the Edwards pattern, for locomotives. The officers of the company are: James W. Carpenter, Dayton, O., President; J. H. Kibbey, Vice-President; J. W. Carpenter, Jr., Secretary and Treasurer; Edgar A. Edwards, Cincinnati, Electrician and Superintendent. The company purposes building shops at Richmond.

The Phoenix Iron Works, in Meadville, Pa., recently shipped to Bangkok, Siam, an engine and boiler to duplicate an order of about eight months ago. The machinery will be taken inland by canoe 200 miles.

The Rail Market.

Steel Rails.—The market is quiet and steady, with plenty of work for the mills. Quotations continue unchanged at \$34 @ \$35 per ton at Eastern mills for ordinary sections, and \$37 @ \$42 for light rails.

Rail Fastenings.—The market is fairly active, with quotations steady at 2.40 cents per pound for spikes in Pittsburgh; 2.75 @ 3.10 for track-bolts and 1.70 @ 1.85 for splice-bars.

Old Rails.—Sales of old iron rails are reported at \$21 @ \$22 per ton at tidewater, with an active demand. Old steel rails are quoted at \$22 @ \$24 per ton in Pittsburgh, with a very short supply.

Lake Superior Iron Ore.

The total shipments of iron ore from the Lake Superior regions up to Oct. 20 are given by the *Marquette Mining Journal* at 8,056,870 tons, against 2,125,459 last year; an increase of 981,411 tons, or 43.8 per cent. About four weeks of navigation remain and the shipments will probably run well up towards 3,500,000 tons for the season.

Shipping Torpedo Boats by Rail.

The United States Navy Department has been making inquiries of several railroad companies as to the possibility of carrying torpedo boats from Atlantic ports to Erie and Chicago by rail. The Department has four sizes of these boats, weighing respectively 65, 55, 35 and 20 tons. The length of boats of the first size is 112 ft., and of the second size 98 ft. It is thought that they can be carried on special trucks, such as were provided by the Pennsylvania Railroad Co. for shipping heavy guns from Pittsburgh.

An English Traversing Crane.

Messrs. Collier & Co., Manchester, are completing a couple of locomotive traversers for the erecting shops of the new works now being built at Harwich by the Lancashire & Yorkshire Railway. Each traverser is 15 ft. 6 in. wide and 28 ft. 8 in. long, and sufficiently strong to carry a locomotive 52 tons in weight. The weight of the locomotive is supported by four wheels with double-flanged steel tires, four wheels without flanges and four steel rollers, so that there are twelve rolling bearings to support the weight, and the bearings of all the wheels and rollers run in gun-metal bushes. The power for driving the traverser is transmitted from the line shafting to a chain barrel, with a worm groove cut from the solid, which is placed in the centre of the traverser bed; the chain on this barrel as it wraps off at one end wraps on at the other, so that the barrel is always full of chain, and it provides a travel for the traverser of 180 ft. To bring the traverser into exact position opposite any pit in the shop, an auxiliary adjusting motion is provided on the top of the traverser, which is worked by hand, and at each end of the traverser supporting pulleys are fixed on brackets to carry the driving-chains. Traversers of this description are, of course, very useful, not only for moving about locomotives, but also for carrying other heavy loads along the shop floor instead of by crane overhead.—*The Engineer.*

Selling Steam.

The condensation of steam in the pipes of the New York Steam Co. is only about 10 per cent., while the loss in pressure in five-eighths of a mile of pipes, maintained at 75 to 80 lbs., is only about 2 to 2½ lbs. The company sells steam by the "kal," a "kal" being one pound of water evaporated under a pressure of 70 lbs., from a temperature of 100 degrees Fahr.

The Bartholdi Statue.

An admirable illustrated article in the *Sanitary Engineer* gives the best description of the engineering details we have seen. The following details will be interesting.

The principal dimensions of the statue are as follows:

	Feet.	Inches.
From bottom of plinth (base of statue proper) to top of torch.....	151	5
From heel to tip of head.....	111	0
Height of head.....	13	4
Width of face.....	2	4
Length of forefinger.....	7	11
Length of nose.....	3	9
Size of finger-nail.....	10½	13½
Total height top of torch above low water.....	305	0

The bottom of the plinth starts at 8 in. above the masonry of the pedestal, this space being left for ventilation. A light interior lattice of iron runs entirely around it on the interior, the verticals of which extend to the masonry as supports.

As a protection against lightning, wells were sunk below the foundation, and openings left in the concrete as it was built up, and five copper rods, each ¾ in. in diameter, were sunk several feet into the water in these wells. The rods were carried up through the interior to the statue in lengths of about 30 ft., made continuous by screwing the ends at junctions into copper disks, and joined to the statue for some 12 ft. of their length by soldering.

The iron work of the statue, aside from the steel girders and bars, weighs 400,000 lbs., and the total weight coming on the girders is about 280 net tons. The copper plates themselves are ¾ in. thick, stiffened in the back by ribs of iron

2 x ¾ in., at intervals of 3 to 4 ft., both horizontal and vertical, shaped irregularly to follow the sinuosities of the figure and appropriately tied to the main interior frame work.

The Bursting of the Gravesend Water-Tower.

The new steel stand-pipe of the Kings County Water Supply Co., just erected under contract of the Robinson Boiler-Works, of Boston, at Sheepshead Bay, Long Island, burst Oct. 17 while being first tested under pressure of 100 lbs. per square inch. The plates were ¾ in. thick for a diameter of 16 ft. Total height of pipe, 250 ft. The *Sanitary Engineer* gives an admirable illustrated account, from which it appears that the fracture began near the base under a nominal strain per square inch of 10,970 lbs., but through the rivet holes, 15,850 lbs. to 18,000 lbs. The conclusions expressed are:

"We are led, therefore, to conclude that the immediate trouble was either in the steel or the method of working it, and probably in both. The occurrence of the calked crack and the crack with rivets at the ends certainly indicates the former. As to the latter, a workman who would do either of the things last-mentioned would not hesitate to use a drifting pin. It seems also to be fully demonstrated that while with punch and bolster properly adjusted as to clearance, holes can be punched in thin steel plates without seriously weakening the steel, the same is not true of thick plates, and that the only safe rule is to drill them, or to punch them and then to ream out about ¾-in. all around the hole. When punched, the metal around the hole is left in a state of strain, and tearing between rivets ensues at much below the full strength of the metal.

"That the failure was progressive is most clearly evidenced to any person who will study carefully the present position of the fragments and tower and the position they occupied before the accident.

"We do not think the failure should deter any person from the use of steel. It rather shows that the engineer who uses it must use it understandingly, and that close inspection is necessary to see first that the steel is of a proper character; and second, that it is honestly and properly manipulated. When this is done we should have no hesitancy in availing ourselves of its superior qualities as a structural material."

Another Sub-Alpine Tunnel.

The construction of a railroad tunnel 3,800 meters (2,36 miles) in length under the Col-de-Cabre, the frontier of the Drôme and Hautes-Alpes, was commenced Sept. 27. The *London Times'* Paris correspondent says it is one of the most important works in the strategic line connecting Central France with the Italian frontier, by Gap and Briançon.

Interlocking Crossing and Bridge Signals.

An interlocking signal system has been erected at the grade crossing of the Boston & Albany by the Providence & Worcester and the Norwich & Worcester roads in Worcester, Mass. This signal system has been examined and approved by the Massachusetts Railroad Commissioners.

The New York, Lake Erie & Western Co. has recently put up interlocking signal systems at the draw-bridges over the Passaic and the Hackensack rivers on the main line between Jersey City and Paterson. The signals at the Passaic bridge were put up by the Union Switch & Signal Co., while the Pennsylvania Steel Co. supplied those at the Hackensack bridge.

Corrugated Tubing.

The Wainwright Manufacturing Co., of Boston, New York, Philadelphia and Pittsburgh, announces that, owing to the gain in heating surface and strength by the use of corrugated tubing, all its manufactures of feed-water heaters, condensers, filters, radiators, etc., will hereafter be fitted with the corrugated tubing.

"The Engineer" on British Bridge-Builders.

We have on previous occasions spoken of the loss to Britain which results from the inertia among our bridge-builders. Some of this is due to the out-of-date regulations of our Board of Trade; but so far has the British bridge-building trade become wedded to old methods of manufacture and terms of business, that American and Canadian bridges are now being bought by English civil engineers for railways in course of construction, though not in either of those countries; but we need not say in which. The orders are going to those countries because really satisfactory bridges can be obtained to carry a given load, and with a guarantee for ten years, for a sum which is not more than 60 per cent. of the price demanded by English builders. The American and Canadian bridges are well-designed, pin structures, in every way satisfying the engineers of the railway; and the builders' price is for the bridges placed upon the piers and finished, the engineers having very little other trouble in the matter than to order them and test them; while for bridges for the same places, if ordered in England, the engineers would have to provide designs and specifications, follow the structures throughout their whole history to completion, and then pay about 40 per cent. more for them. In railway matters, again, the transatlantic constructors will provide rolling stock for prices and terms which afford facilities that probably not more than one English firm give.—*The Engineer.*

"Dolly-Pieces" and Single-Wheeled Engines.

The advocates of coupled engines would make merry over the delay which occurred on the morning of Tuesday the 21st inst. to the boat train conveying the Dieppe passengers to London at Lewes, where a sharp curve and heavy gradient are combined. The engine, one of a single pair of drivers only, was quite unable to get away with a train of 12 vehicles in spite of careful handling and a free application of sand. It was not possible to help up from behind with an engine which stood on a contiguous siding, owing to the points being covered by the train, and it was some 20 minutes before the rear vehicle uncovered the points and enabled this to be done. No attempt seemed to be made to obtain the very little assistance required to enable the train to get fairly away by means of a rope attached to the supplementary engine on the line at one side. Surely this might have been done or a piece of timber might have been used as a dolly piece. Some really good device for temporarily increasing the weight on the drivers of single engines would be a real boon. It is only when starting that these engines are inefficient, whilst at high speed the absence of coupling rods is desirable.—*Mechanical World.*

Economy in Locomotive Traction.

While in England and Germany the attention of railway engineers has been chiefly directed to the question of compounding locomotive engines, economy has been sought in a different direction in France. M. Ricour, Chief Engineer of the Rolling Stock of the French State railways, introduced three years ago cylindrical or piston valves instead of the flat slide valves, and air admission valves to the cylinders, which seem to have answered well. Since then he has introduced the refractory brick arch in the fire-box commonly used in England and America, and shields for reducing the air resistances placed in front of the locomotive and in the spaces between the carriages. From a report of his published in the *Annales des Mines*, the latter improvement has been introduced on 24 machines by the middle of last year, the arches on 24, and the piston and air valves more generally. By these

means and the exclusive use of mineral oils for lubrication, he deduces from the results obtained in practice that the total saving per engine will amount to £160 per annum. Although some of these improvements are already generally used on English lines, there are others, as piston valves and shields to reduce the resistance of the air, which might be tried with promise of success. Piston valves are, of course, more difficult to find room for with our inside cylinder engines than with the outside cylinder engines on the Continent, but it is surprising that not more experiments have been made to reduce the air resistance by covering the spaces between carriages or putting a bow to the engine. Nobody would think of making a ship with a square front end, yet this apparently is considered a good shape for a locomotive cutting through the air like an arrow. We think it probable that a not inconsiderable reduction of the train resistances and cost of traction could be obtained by such means, and in any case consider them worth a trial.—*Mechanical World.*

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Baltimore & Ohio, annual meeting, at the office in Baltimore, at 10 a. m., Nov. 15.

Boston & Lowell, special meeting, in Boston, Oct. 30, to vote on the proposed lease of the Massachusetts Central road.

Massachusetts Central, special meeting, in Boston, Oct. 30, to vote on the proposed lease of the road to the Boston & Lowell.

Peoria, Decatur & Evansville, special meeting, in Peoria, Ill., Dec. 20.

Richmond & West Point Terminal Co., special meeting in Richmond, Va., Nov. 19.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Concord, 5 per cent., semi-annual, payable Nov. 1.

Manchester & Lawrence, 5 per cent., semi-annual, payable Nov. 1, to stockholders of record on Oct. 23.

Foreclosure Sales.

The *Detroit, Mackinac & Marquette* road was sold under foreclosure Oct. 20, and was bought for \$1,010,000 by a syndicate of bondholders, who purpose using it as part of a line from Duluth to the Sault Ste. Marie. Their plan of reorganization is explained elsewhere.

The *Toledo, Peoria & Western* road was to be sold in Chicago, Oct. 29, under the decrees of foreclosure granted by the United States Circuit Court.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Association of Railroad Truckmen of North America* will meet at Council Bluffs, Ia., on Thursday, Nov. 25.

The *Master Car-Builders' Club* holds its regular meetings at the rooms, No. 113 Liberty street, New York, on the third Thursday in each month.

The *New England Railroad Club* holds its regular meetings at its rooms in the Boston & Albany passenger station in Boston, on the second Wednesday of each month.

The *Western Railway Club* holds its regular meetings at its rooms in Chicago on the third Wednesday in each month.

American Street Railway Association.

The principal report presented at the meeting in Cincinnati last week was the report of the Executive Committee on Strikes, which very strongly condemned the Knights of Labor and kindred organizations. The report recommended arbitration in cases of difference between companies and employes.

Papers were read as follows: Edward J. Lawless, of Kansas City, on "Progress of Cable Motive Power." This was interesting and was generally discussed. This report condemned all single-track cable lines.

"Progress of Electric Motive Power," Mr. T. C. Robbins, General Manager Baltimore Union Passenger Railway, Baltimore Md.

"Ventilation, Lighting and Care of Cars," Mr. Walter A. Jones, Vice-President Williamsburg & Flatbush Railroad Co., Brooklyn, N. Y.

Other discussions were had on matters of interest. The meeting closed with a dinner at the Gibson House, given to the visitors by the street railroad companies of Cincinnati, Covington and Newport.

Brotherhood of Railroad Bratemen.

The meeting of this Association at San Antonio, Tex., has continued through the week. The convention sits with closed doors, but it is understood that there was much discussion over the application for readmission made by certain members who had been expelled for joining in strikes not countenanced by the Brotherhood. Other business of importance was transacted.

Brotherhood of Locomotive Engineers.

The Brotherhood of Locomotive Engineers has continued its business sessions with closed doors during the week. On Oct. 23 the delegates with their wives and invited guests enjoyed an excursion to Glen Island on Long Island Sound. On Sunday, Oct. 24, they went to Brooklyn in a body and heard an eloquent and appropriate sermon from Rev. Dr. T. Dewitt Talmage. On the evening of Oct. 25 they attended a reception given by the Railroad Young Men's Christian Association, which was an exceedingly pleasant occasion.

These entertainments were not allowed to interfere with business, however, and the delegates have been at work each day at Lyric Hall. The convention is expected to close this week.

On Oct. 26 the delegates went on an excursion up the Hudson River to Newburg by steamboat.

The discussions in the Monday sessions were on some amendments to the rules of the Insurance Department, which were adopted.

ELECTIONS AND APPOINTMENTS.

Arkansas.—The directors of this new company are: J. J. Horner, S. H. Horner, J. B. Johnson, G. T. Updegraff, Helena, Ark.; H. E. Mussey, Elyria, O.; A. J. Johnson, Oberlin, O.; C. H. Jenkins, Sandusky, Ohio.

Chicago, Havana & Western.—This company, successor to the Champaign, Havana & Western, has the following directors: Jackson Caldwell, Urbana, Ill.; M. A. McDonald, Danville, Ill.; James J. Fletcher, Cairo, Ill.; Anthony J. Thomas, Llewellyn Thomas, New York.

Cincinnati, Indianapolis, St. Louis & Chicago.—At the annual meeting in Indianapolis, Oct. 26, the old directors were re-elected as follows: M. E. Ingalls, George Hoadly, Samuel J. Broadwell, B. F. Evans, George Wilshire, Larse

Anderson, O. Smith, Thomas A. Morris, Allen M. Fletcher, R. R. Cable, F. T. Jefferey, George Bliss, C. P. Huntington.

Cincinnati, Jackson & Mackinaw.—Mr. J. M. C. Marble has been chosen President in place of W. C. Sheldon. Resigned. Mr. Marble will continue to act as General Manager.

Greenville & Laurens.—At the annual meeting in Laurens, S. C., Oct. 14, the old directors were elected, except that W. G. Raoul was chosen to succeed M. Sullivan. Mr. A. B. Byrd was elected Treasurer and Mr. Andrew Anderson, Secretary.

Lehigh & Hudson River.—The following from President Grinnell Burt is dated Warwick, N. Y., Oct. 21: "The following appointments are hereby made, to take effect this date: 1. Mr. E. M. Reynolds to be Assistant General Passenger Agent. 2. Mr. Morris Rutherford to be Assistant General Freight Agent."

Missouri Pacific.—Mr. John Toole has been appointed Roadmaster of the Hannibal Division, Missouri, Kansas & Texas line. He was recently on the Iron Mountain Division.

Nashville & Decatur.—This company, whose road is leased to the Louisville & Nashville Co., has elected J. W. Sloss, President; George W. Sery, Secretary.

Naugatuck.—The following, from President Wm. D. Bishop, is dated Bridgeport, Conn., Oct. 15: "Mr. Henry D. Beach has been appointed Assistant Superintendent of this company. Appointment to take effect Oct. 1, 1886."

New England Roadmasters' Association.—At the annual convention last week, officers were elected as follows: President, A. C. Stevens, Boston & Maine; Vice-President, J. S. Lane, New York, New Haven & Hartford; Chaplain, E. H. Homer, Central Vermont; Secretary, W. F. Ellis, Providence & Worcester; Treasurer, J. R. Patch, Connecticut River; Executive Committee, P. A. Eaton, Concord, L. H. Perkins, New York, New Haven & Hartford, and G. W. Bishop, Fitchburg.

New Hampshire Railroad Commission.—Mr. H. M. Putney, of Manchester, has been chosen Chairman of the Commission in place of Mr. O. C. Moore, whose term has expired.

Orlando & Winter Park.—The office is in Orlando, Fla.; the directors are J. H. Abbott, J. T. Beck, R. J. Gilham, C. G. Lee, P. W. Lowndes.

Ottawa, Waddington & New York.—At the annual meeting in Ottawa, Ont., Oct. 22, a dispute arose and the stockholders divided. The Farlinger party elected a board of directors who chose officers as follows: President, John Redington; Vice-President, Charles O. Dell; Secretary and Treasurer, Capt. Farlinger. They claim to possess all documents and books of the company, except a minute book, and to have the official seal. They also claim to represent the entire capital of the concern. The opposition, or Hickey party also elected a board of directors who chose Dr. Hickey, President; Dr. McIntyre, Vice-President; R. C. Carter, Secretary.

Pennsylvania.—Mr. F. F. Robb is appointed Assistant Engineer of the Schuylkill Valley Division. Mr. George L. Cummings is appointed Assistant Engineer of the Monongahela Division in place of F. F. Robb, transferred.

Pullman's Palace Car Co.—The directors chosen at the recent annual meeting in Chicago are: John Crerar, J. W. Doane, Marshall Field, George M. Pullman, O. G. A. Sprague, Norman Williams, Chicago; Henry C. Hulbert, New York.

Richmond & Danville.—The following is dated Washington, Oct. 18:

1. Mr. Jas. H. Hill is announced as General Baggage Agent of this company, with office at Richmond, Va.

2. All changes in employes whose duties are in connection with handling baggage will be promptly communicated to Mr. Hill by the Division Superintendent.

The following is dated Oct. 20: "The duties of Mr. P. H. Adams, General Claim Agent of the Piedmont Air Line, West Point, Va., are hereby extended over the Virginia Midland Division."

Rutland & Woodstock.—This company has elected officers as follows: President, Rockwood Barrett, Sherburne, Vt.; Clerk and Treasurer, L. C. Kingsley.

St. Louis, Arkansas & Texas.—W. R. Crumpton and D. H. Houlihan, having resigned as Superintendent and Assistant Superintendent, to take effect Nov. 1 next, the following appointments are made: W. P. Homan, Assistant General Manager, Texarkana, Tex.; J. B. Van Dyne, Superintendent of Transportation, Texarkana, Tex.; F. A. Lister, Master of Transportation, Missouri & Arkansas Division. Mr. Homan will have full control of the operating, mechanical and maintenance departments, with authority to regulate such traffic as may originate on the line if necessary. Mr. Van Dyne will have charge of the movements of all trains. Mr. Homan has been a resident of Little Rock, and was at one time connected with the Iron Mountain road.

Santa Rosa.—The office of this company is in Santa Rosa, Cal.; the directors are George P. Noonan, Wm. H. Orr, Thomas J. Proctor, James B. Rue, John Walker.

Vermont & Canada.—This company, which retains its organization, although now wholly owned by the Central Vermont, elected directors as follows, Oct. 21: J. H. Mason, Richmond, Vt.; J. P. Clark, Milton, Vt.; J. Gregory Smith, E. C. Smith, St. Albans, Vt.; A. S. Hall, F. H. Perkins, A. Russ, Boston.

Wabash, St. Louis & Pacific.—Mr. D. Brock has been appointed Trainmaster of districts 10 and 15, Middle Division, with office in Decatur, Ill., in place of E. L. Ryder, resigned. Mr. L. L. Hibbard succeeds Mr. Ryder as Trainmaster of District 13, Middle Division.

Western Maryland.—At the annual meeting in Baltimore, Oct. 20, the following directors were chosen by the stockholders: Joshua Biggs, George W. Harris, C. W. Humrichouse, John K. Longwell, Edward Worthington. The remaining eight directors are appointed by the city of Baltimore.

PERSONAL.

—Mr. W. C. Sheldon has resigned his position as President of the Cincinnati, Jackson & Mackinaw Company.

—Mr. E. L. Ryder has resigned his position as Trainmaster of the Middle Division of the Wabash, St. Louis & Pacific road.

—Mr. John G. Kimball, a well-known citizen and banker, died in Goffstown, N. H., Oct. 19. He was Treasurer of the Peterboro Railroad Co. for several years.

—Frank J. F. Bradley, who was recently dismissed from the position of Manager of the Pullman Works at Pullman, Ill., and was afterward arrested for embezzlement, was tried in Chicago, Oct. 21. He made no defense, but put in a plea

of guilty, and was sentenced to five years' imprisonment in the Joliet penitentiary.

—Hon. Mason W. Tappan, Attorney-General of New Hampshire, died at his home in Bradford, N. H., Oct. 24. He was stricken with apoplexy on the morning of Oct. 1, and remained in a semi-conscious condition until his death. Mr. Tappan was born at Newport in 1817. He was finely educated and chose the profession of law. He served in the New Hampshire Legislature in 1853-4, and in the latter year was elected to Congress by the Whigs, Free Soilers, Independent Democrats and Americans, and served three terms with distinguished ability. Just prior to the war he was one of a select committee of 33 to which was referred so much of the President's message as related to the then disturbed state of the country. In 1861 he was appointed Colonel of the First New Hampshire Regiment and served three months. He was for 25 years one of the leading lawyers of New Hampshire, and was engaged in many noted trials. He was a director of the Concord & Claremont Co., and was connected with other New Hampshire companies as a director or counsel.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Nine months to Sept. 30:				
	1886.	1885.	Inc. or Dec.	P. c.
Balt. & Potomac.	\$979,202	\$974,270	I.	\$4,930 0.5
Net earnings...	392,497	384,655	I.	7,842 2.0
Bos. & Tex. C.	1,917,250	1,535,110	I.	382,140 24.9
Mexican National.	1,385,206	1,138,194	I.	247,012 21.7
Mich. & Ohio	160,093	130,890	I.	29,204 22.3
N. Y. C. & H. R.	23,629,759	17,619,272	I.	6,010,487 34.1
N. Y., Sus. & W.	799,292	803,519	D.	4,227 0.5
Northern Central.	4,068,833	3,965,618	I.	103,215 2.6
Net earnings...	1,379,654	1,561,909	D.	182,255 11.7
Eight months to Aug. 31:				
Denver & R. G.	\$4,104,662	\$3,846,335	I.	\$258,327 6.7
Net earnings...	1,423,995	1,274,375	I.	149,620 11.7
Oreg. Short Line.	1,383,280	1,138,918	I.	244,362 21.5
Peoria, Dec. & E.	387,266	353,356	I.	33,910 9.6
Net earnings...	501,488	463,305	I.	38,183 8.3
Rome, Wat. & Og.	241,524	202,547	I.	38,977 19.2
Net earnings...	1,613,709	1,064,753	I.	548,956 51.5
Month of August:				
Chi. & Ohio R.	\$9,745	\$7,683	I.	\$2,062 26.8
Net earnings...	5,000	4,000	I.	1,000 25.0
Den. & R. G.	614,639	562,734	I.	51,905 9.2
Net earnings...	248,522	237,202	I.	11,320 4.8
Oreg. Short Line.	151,880	186,128	D.	34,248 22.6
Net earnings...	25,269	79,808	D.	54,539 68.2
Peoria, Dec. & E.	90,778	81,017	I.	9,761 12.0
Net earnings...	59,573	45,579	I.	13,994 30.4
Month of September:				
Balt. & Potomac.	\$122,635	\$112,071	I.	\$10,564 8.6
Net earnings...	60,010	55,044	I.	4,966 8.3
Bos. & Tex. C.	378,929	300,940	I.	77,989 25.9
Mexican National.	128,962	113,614	I.	15,348 13.5
Mich. & Ohio	20,206	20,053	I.	153 0.8
N. Y. C. & H. R.	3,058,548	2,437,688	I.	620,860 25.5
N. Y., Sus. & W.	102,817	105,354	D.	2,537 2.4
Northern Cen.	472,944	504,753	D.	31,809 6.3
Net earnings...	159,785	227,276	D.	67,491 29.7
Tol., A. A. & N. M.	33,166	29,334	I.	3,832 13.0
Third week in October:				
Buff., R. & Pitts.	\$28,448	26,913	I.	\$1,535 5.7
Canadian Pacific.	234,000	209,000	I.	25,000 11.9
Chi. & Atlantic.	40,916	38,087	I.	2,829 6.9
Chi., Mil. & St. C.	580,000	580,937	D.	937 0.2
C. I. St. L. & C.	56,344	50,620	I.	5,724 11.2
Chi. & N. W.	630,200	638,100	D.	7,900 1.2
Den. & R. G.	157,658	141,435	I.	16,223 11.5
Grand Trunk.	373,787	333,054	I.	40,733 12.2
Mil., L. S. & W.	60,615	36,589	I.	24,026 64.9
Mil. & Northern.	14,721	11,492	I.	3,229 28.1
St. L. & San F.	120,900	107,000	I.	13,900 12.2
Webb, St. L. & P.	269,000	267,000	I.	2,000 0.7

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Chicago Shipments Eastward.

The Board of Trade reports east-bound shipments from Chicago for the week ending Oct. 23 as follows, in tons, the report including local as well as through shipments:

	Tons.	P. c.
Chi. & Gd. Trunk	4,740 10.3	Pitts. Ft. W. & C. 7,072 15.4
Mich. Central	5,941 15.1	Chi., St. L. & Pitts. 7,241 15.8
Lake Shore	7,815 17.1	Balt. & Ohio 3,167 6.9
N. Y., Chi. & St. L.	4,235 9.3	C. Ind. St. L. & C. 4,600 10.1

This is a total of 45,820 tons, the heaviest shipments reported for a number of weeks past.

Shipments for six weeks past by these reports have been, in tons:

	Sept. 18.	Sept. 25.	Oct. 2.	Oct. 9.	Oct. 16.	Oct. 22.
42,468	36,023	36,122	43,556	41,347	45,820	

Shipments by the Chicago & Atlantic road are not reported, and are not included in the totals given above. The shipments by that road are reported at 5,819 tons for the week, making a total of 51,639 tons.

Cotton.

Cotton movement for the week ending Oct. 23 is reported as follows, in bales:

	1886.	1885.	Inc. or Dec.	P. c.
Interior markets:				
Receipts	178,757	178,737	I.	20 0.0
Shipments	137,088	136,687	I.	401 0.3
Stock, Oct. 22.	185,521	161,182	I.	24,339 15.1
Seaports:				
Receipts	206,818	201,704	I.	5,114 2.5
Exports	147,722	153,029	D.	5,307 3.6
Stock, Oct. 22.	553,322	534,773	I.	18,549 3.5

The total movement from plantations for the crop year to Oct. 22 is estimated at 1,274,414 bales, against 1,317,672 last year, 1,311,047 in 1884 and 1,461,051 in 1883.

Central Traffic Association.

At the meeting in Chicago last week, all the unsettled questions between this Association and the trunk lines were satisfactorily adjusted. It was agreed to remove the compilation of east-bound statistics from Commissioner Fink's office in New York to Commissioner Blanchard's office in Chicago. Hereafter all east-bound statistics will be compiled by Commissioner Blanchard, and all west-bound statistics by Commissioner Fink. A report was submitted regarding the division of expenses between the Central Traffic Association and the trunk lines, and it was decided that each association should pay its own expenses. A resolution was passed calling upon the trunk lines to enforce the existing contract in regard to the maintenance of agreed rates, and a further resolution agreeing not to meet cut rates was adopted. It was agreed that the Executive Committee of the Central Traffic Association and the trunk lines should form a joint committee. Commissioner Fink is to be Chairman and Commissioner Blanchard Western Vice-Chairman. Heretofore votes on tobacco and cotton rates and changes in the east-bound classifications were taken by Commissioner Fink, and the result was promulgated by him; hereafter votes will be taken by Commissioner Blanchard in the West and by Commissioner Fink in the East, and the results will be promulgated by them jointly.

On the second day it was agreed to advance the minimum

weight on live stock shipments so as to cover excess weight, and if it is found that there is any excess in weight the Association will refund the money. A committee of Buffalo live stock dealers came before the meeting and entered a protest against the manner in which the rule for weighing live stock at the various points is carried out. They claimed that the rule was not enforced at Indianapolis, Cincinnati, and other points, which fact placed the Buffalo dealers at a disadvantage. The committee was informed that the meeting had decided to advance the minimum weight of carloads to cover excess, and that this rule would apply at all association points.

There was a long and animated discussion over a proposition to stop prorating arrangements with the Lehigh Valley Railroad, if that company, which is not a member of the trunk line pool, persists in cutting rates. Several of the roads protested against such action, claiming that they had traffic arrangements with the Lehigh Valley road, which could not be abrogated. It was also said that the Chesapeake & Ohio Railroad is cutting rates from Southwestern points, and that some action ought to be taken to prevent that company from diverting business from the regular pool lines. Finally a committee was appointed to find out what action can be taken to prevent the roads named from cutting rates, to report to the next meeting.

Petroleum.

The production and shipments of the Pennsylvania and New York oil wells for September are given by *Stowell's Petroleum Reporter* as follows, in barrels of 42 gallons:

	1886.	1885.	Inc. or Dec.	P. c.
Production.....	2,418,540	1,712,790	I. 705,750	41.2
Shipments.....	2,157,323	2,116,659	I. 40,664	1.9
Stock, Sept. 30.....	35,061,614	34,939,902	I. 121,712	0.3
Producing wells.....	25,243	22,775	I. 2,468	10.8

Of the total production the Allegheny District in New York furnished 5.8 per cent.; the Bradford District in Pennsylvania, 22.8; the Warren District, 15.2; the Lower District, 34.9; and the Washington District, 21.8 per cent.

Stock was increased during the month by 261,217 barrels, the excess of production over shipments.

Shipments for the month are reported as follows:

	Crude.	Refined.	Total.	P. c.
New York.....	538,686	85,798	624,484	28.9
Philadelphia.....	710,195	142,327	852,522	39.5
Baltimore.....	73,994	10,827	84,791	3.9
Boston.....	17,617	88,081	105,698	4.9
Cleveland.....	161,354	.....	161,354	7.5
Pittsburgh.....	86,134	.....	86,134	4.0
Local points.....	158,358	83,982	242,340	11.3
Total.....	1,746,308	411,015	2,157,323	100.0

In this table the refined oil is that refined at the Creek refineries in the oil regions; it is reduced to its equivalent in crude, so that the total represents the amount of crude oil shipped to each place, whether going in crude or in refined form.

Southwestern Passenger Pool.

At the meeting held in Chicago last week the Pool Committee made a report, which was discussed, adopted and finally referred to the several companies for approval. The St. Louis & San Francisco was not represented and will, it is understood, decline to enter the pool.

Traffic Notes.

At a meeting of the lines in the Chicago-Ohio River Pool in Chicago last week a resolution was passed providing that rates should be strictly maintained.

The Chicago & Alton and the Rock Island have asked for a new award of percentages in the Southwestern lumber pool.

A meeting to adjust passenger rates to Mississippi River points was held in Cedar Rapids, Ia., Oct. 21. Only routine business was transacted.

A new route to Richmond, Va., has been opened, boats running from that city to Cape Charles, Va., in connection with the New York, Philadelphia & Norfolk road.

Coal.

Coal tonnages for the week ending Oct. 16 are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Anthracite.....	779,093	776,082	I. 3,011	0.4
Eastern bituminous.....	273,565	248,538	I. 25,027	10.1
Coke.....	69,741	50,874	I. 18,867	37.0

The anthracite coal trade keeps up well, in spite of the continued warm weather. Another advance in prices is looked for.

Bituminous trade is active and shippers are complaining of a scarcity of cars. This, however, is a common trouble at this season.

East-Bound Freight Rates.

Chicago dispatches report accusations of cutting on east-bound rates, and of special contracts to shippers, and state that the attention of the Central Traffic Association has been called to the case.

RAILROAD LAW.

Railroad Rates — Discrimination — Interstate Commerce.

A Washington dispatch of Oct. 25, says: "The United States Supreme Court rendered its decision to-day in the case of the Wabash, St. Louis & Pacific Railroad Co., plaintiff in error, against the people of the state of Illinois. The specific allegation was that the railroad company charged Elder & McKinney 15 cents per 100 lbs. for transporting goods from Peoria to New York city, and on the same day charged Isaac Bailey and F. O. Swannell 25 cents per 100 lbs. for the same class of goods from Gilman, Ill., to New York, Gilman being 86 miles nearer than Peoria to New York.

"The discrimination, it was alleged, was in violation of the law of Illinois, which prohibits any charge for the transportation of passengers or freight within the state of Illinois proportionately greater than would be charged for the transportation of passengers or like classes of freight 'over a greater distance of the same road.' The gist of the decision is contained in the conclusion as follows:

"When it is attempted to apply to transportation through an entire series of states a principle of this kind, and each one of the states or of half a dozen states shall attempt to establish its own rates of transportation, its own methods to prevent discrimination in rates, or to permit it, the deleterious influence upon the freedom of commerce among the states and upon the transportation of goods through those states cannot be overestimated. That this species of regulation is one which must be, if established at all, of a general and national character, and cannot be safely and wisely be limited to local rules and local regulations, we think is clear from what has already been said. And if it be a regulation of interstate commerce, as we think we have demonstrated it is, and as the Illinois Court concedes it to be, it must be of that national character, and the regulation can only appropriately be by general rules and principles which demand that it should be done by the Congress of the United States under the commerce clause of the Constitution."

"The judgment of the Supreme Court of Illinois, which was adverse to the railroad, is reversed and the case is remanded to that Court for further proceedings in conformity with this opinion. Opinion by Justice Miller.

"Justice Bradley delivered a dissenting opinion, in which the Chief Justice and Justice Gray concurred. In this opinion it is conceded that Congress might, if it saw fit, regulate the matter under consideration, but not having done so, it is held that the state does not lose its power to regulate the charges of its own railroads in its own territory simply because the goods or persons transported have been brought from or are destined to a point beyond the state border."

Rolling Stock Used in Interstate Commerce.

A Chicago dispatch of Oct. 26 says: "A novel bill was filed yesterday in the Federal Court by the Louisville, New Albany & Chicago Railroad Co., to enjoin the County Treasurer from collecting taxes on its rolling stock. The company makes the plea that its rolling stock is exempt because its business is interstate commerce, it being an Indiana corporation, and coming into Illinois only over a line leased from the Chicago & Western Indiana Railroad Co. It derives an exemption, it claims, from being a common carrier under the Federal laws. Its business under its lease is not local, that is, between Illinois points, but solely the delivery and embarkation of through, that is, interstate passengers and freight. Judge Gresham ordered that the County Treasurer show cause by Monday next why the injunction should not issue.

"The Western Indiana terminal facilities here are utilized in a similar manner by a number of roads, and the proceedings will be watched narrowly."

OLD AND NEW ROADS.

Arkansas.—This company has been organized to build a railroad from Helena, Ark., west to the Indian Territory line, about 280 miles, with a branch to Hot Springs, about 25 miles long.

Atchison, Topeka & Santa Fe.—In relation to the removed extension from Kansas City to Chicago, President Strong is reported as saying that while nothing definite had yet been agreed upon, the chances were in favor of building a line, as he personally was strongly in favor of it. He could not see how his company could possibly get along without a line of its own from the Mississippi River to Chicago. The Atchison Co. has been much too conservative during the last few years, and thus allowed its territory to be invaded by most of the Chicago and St. Louis lines. The Burlington had built to Denver, and was tapping the Atchison everywhere, contrary to agreements. The Rock Island was now engaged in building a line into Atchison territory, and the Missouri Pacific had covered Southern Kansas with a network of railroads, and is doing serious injury to the Atchison by reckless competition. Besides, the Rock Island and the Northwestern roads were now invading the Atchison Co.'s territory by way of the Marysville cut-off of the Union Pacific. The Atchison, not having an independent outlet east from the Missouri River, was at a great disadvantage, and would not be able to compete effectively against the other lines until it had a line of its own to Chicago. It was but fair to presume that the Atchison, with about 5,000 miles of road west of the Missouri River, would be able to provide a line east of the river with sufficient business to make it pay, no matter how many competitors were in the field. Mr. Strong admitted that his company would have preferred to secure control of the Chicago & Alton road, either by purchase or lease, as that would have relieved the Santa Fe from building a new line east of the Missouri, and the Alton from building a new line west of the river. But all negotiations to that end failed on account of the present owners of the Alton refusing either to sell or lease. He understood that a majority of the Alton stock might be obtained at 140 per share, but this was much more than the Atchison could afford to pay for the property.

Bellefonte & Eastern.—This company has filed articles of incorporation in Pennsylvania to build a railroad from Milton, Pa., to Bellefonte, a distance of 50 miles.

Buffalo, New York & Philadelphia.—An interfering petition has been filed by Alfred Cohen and Wm. T. Jebb, bondholders, asking leave to come into the foreclosure suit to protect their interests as against the syndicate which is reorganizing the company.

Cairo, Vincennes & Chicago.—Mr. Anthony J. Thomas, Managing Receiver, issues the following statement for the four months from May 1 to Aug. 1:

Gross earnings (\$909 per mile).....	\$241,703
Expenses and taxes (69.7 per cent.).....	168,534

Net earnings (\$275 per mile).....\$73,169

"This road (formerly the Cairo Division of the Wabash, St. Louis & Pacific) was separated from that system and turned over to a receiver appointed in the interest of the Cairo Division bondholders in April, 1885.

"The total indebtedness against the property, including bonded debt and accrued interest thereon to date, receiver's obligations, etc., does not exceed \$5,000,000. There is no capital stock.

"The net earnings for the first four months of present fiscal year, as shown above, are equal to 4 per cent. per annum on entire indebtedness. Length of road 266 miles."

Canastota & Northern.—This road, which is to run from Canastota, N. Y., to Camden and thence to Carthage, has been surveyed and located. An extension or branch to reach the Jayville iron mines is proposed. The people on the line have offered subscriptions to a considerable amount for the road.

Central, of New Jersey.—The directors have issued a statement showing the circumstances leading to the new receivership, which is substantially as follows:

Interest on the different mortgages of the company has been in arrears ever since the Philadelphia & Reading Railroad Co. failed to pay the stipulated rent under the lease. Foreclosure suit was commenced, and application for the appointment of receivers made by the trustee of the adjustment mortgage on Feb. 14, 1886. The directors were hopeful that the difficulties of the company resulting from the insolvency of the Philadelphia & Reading Co. might be tidied over without receivership or foreclosure. They therefore requested postponement of action on the part of the bondholders, and urged a joint effort on the part of both bondholders and stockholders to this end.

Their request was complied with, and Messrs. John S. Kennedy, James A. Roosevelt and George C. Williams were elected members of the board. A committee of the board was subsequently appointed to make a careful examination into the affairs of the company, and to take such measures as they might deem expedient for its welfare. This committee unanimously reported in favor of reorganization with an intermediate receivership, and recommended harmonious action between the directors and the trustees of the adjustment mortgage in securing the appointment of receivers and in devising and carrying into execution a plan of reorganization.

Their report was adopted by the board, and pursuant to

its recommendation Messrs. Kennedy and Harris were requested to act as receivers, in the belief that their appointment would afford satisfactory guarantee to both stockholders and bondholders that the affairs of the company would be administered to its best advantage. The board hopes, at an early day, with the co-operation of the trustees and receivers, to present a plan of reorganization which will involve the least possible sacrifice on the part of stockholders and bondholders consistent with reorganization on a basis of permanent prosperity. Appended is the report of the special committee appointed last May, which contains the following conclusions:

"1st. The company has no means with which to pay its present indebtedness, and no unpledged securities available for a loan with which to fund them.

"2d. Means to put the property in a condition of complete efficiency are quite as necessary as means to pay indebtedness. The policy of the Receivers of the Philadelphia & Reading, as expressed in their orders, has been 'to keep the expenses down to the lowest possible limit consistent with the safe working of the road.' Extraordinary repairs are therefore needed.

"3d. In the opinion of many the Philadelphia & Reading Co. and its Receivers have not operated the property to its best advantage under the lease, and its earnings would be largely increased by independent management.

"Our company has the option at any time of resuming control and operation of its own property, but it cannot safely do so until provision is made to meet present indebtedness and make these extraordinary repairs. This seems impracticable.

"4th. Almost the entire debt of the Central Railroad bears 7 per cent. interest. The roads with which it is competing are able to obtain money at 4 and 5 per cent. interest, and the Reading, its chief competitor, is about to be reorganized on a basis of not exceeding 4.

"5th. The company must have new capital with which to make necessary betterments and extensions, otherwise it cannot initiate many important economies or meet the aggressive competition which must be expected from its more prosperous rivals.

"6th. To insure stability there should be sufficient margin between earnings and fixed charges to meet the losses of a period of depression in the coal trade, or of continued labor trouble. Its earning capacity shares all the uncertainties of the coal market, and these uncertainties should be guarded against by the accumulation of some surplus.

"For these reasons we are of the opinion that permanent prosperity can only be attained by a reorganization, with an intermediate receivership."

Chicago, Havana & Western.—This company has been organized by the bondholders who purchased the Champaign, Havana & Western road at foreclosure sale. The road, which was formerly a part of the Wabash system, extends from Champaign, Ill., west to the Illinois River at Havana, with a branch from White Heath to Decatur. This road was originally the Western Extension of the Indianapolis, Bloomington & Western; was sold under foreclosure and reorganized as the Champaign, Havana & Western; then sold to the Wabash, and is now again reorganized under a second foreclosure.

Chicago, Madison & Northern.—Bids have been received for the grading of 75 miles of this road from 39 contractors. The contract has not yet been let, as a new survey is to be made of the line near Rockford, Ill., to decide whether it shall pass through that city.

The question of the entrance into Madison, Wis., has been settled, the City Council having passed an ordinance giving the company right of way into the city over certain streets.

Chicago, Milwaukee & St. Paul.—On Oct. 25 this company opened for traffic an extension of the Hastings & Dakota Division from Ellendale, Dak., northwest to Edgeley, 26½ miles. On the same date the Armour Branch of the Sioux City & Dakota Division was opened for business; it extends from Tripp, Dak., to Armour, 20 miles.

Chicago & Northwestern.—The Redfield Branch of the Dakota Division is now completed to Faulkton, Dak., 32¼ miles westward from the late terminus at Redfield. Faulkton will be the terminus of the line for the winter. The new stations, with the distances from Redfield, are: Tell, 10.6; Rockham, 15.2; Bacon's Siding, 23.5; Faulkton, 32.5 miles.

Chicago, Rock Island & Pacific.—Work is now actively in progress on this company's extensions in Kansas. On the line from St. Joseph to Topeka the grading is nearly finished, and tracklaying will be begun next week. On the line from St. Joseph to Nelson, Neb., grading is also well advanced.

Chicago & West Michigan.—Negotiations have been in progress for a sale of the controlling interest in this company to the syndicate which is reorganizing the Michigan & Ohio. They have finally closed, because the Boston owners of the stock held it at a higher price than the syndicate was willing to pay.

Cincinnati, Indianapolis, St. Louis & Chicago.—At the annual meeting in Indianapolis, Oct. 26, the directors were authorized to increase dividends as justified by earnings. A resolution was adopted authorizing trustees to issue and sell 30,000 additional shares, \$3,000,000 stock. President Ingalls says it is not the purpose to issue this stock, but this action was necessary to meet the requirements of law, which provides that the amount of stock shall equal the amount of bonds.

Detroit, Mackinac & Marquette.—This road was purchased under foreclosure, Oct. 20, by F. P. Olcott, of the Central Trust Co. of New York, Chairman of the syndicate formed to build the Duluth, South Shore & Atlantic Railroad. The price paid was \$1,010,000, subject to a bonded debt of \$3,040,000. The Detroit, Mackinac & Marquette will be reorganized by the issue of \$1,500,000 first-mortgage 5 per cent. bonds, \$3,000,000 preferred 6 per cent. stock and \$5,000,000 common stock. Each first-mortgage bond of \$1,000 will receive for principal and unpaid coupons \$500 new bonds and \$700 preferred stock; each income bond \$500 in preferred stock and \$1,000 in common stock; old stock 50 per cent. in new stock. There will be reserved in the treasury for the construction and equipment of the proposed branch to Sault Ste. Marie, 48 miles, \$490,000 in first-mortgage bonds, 654,000 in preferred stock and \$1,125,000 in common stock. The assent of nearly all the holders has been secured.

Duluth, South Shore & Atlantic.—A syndicate, of which Mr. C. R. Cummings, President of the Union National Bank of Chicago; Calvin S. Brice and F. P. Olcott, of New York; James McMillan, of Detroit; Norman B. Ream, of Chicago; Samuel Thomas, of the East Tennessee, Virginia & Georgia; George I. Seney, and A. D. Juillard, are members, has organized the Duluth, Sault de Sainte Marie & Atlantic Railroad Co. for the purpose of establishing a line from Duluth, via Superior City, Ashland and Marquette, to Mackinaw and Sault Ste. Marie. Its length will be 410 miles, from Duluth to Sault Ste. Marie, with a branch 50 miles long to Mackinaw.

A member of the syndicate makes the following state-

ment: "This road will, at its western terminus, connect with the Northern Pacific, the Manitoba, the St. Paul & Duluth, the Omaha, the St. Paul and the Wisconsin Central. At its eastern terminus at Mackinaw it will connect by a transfer with the Michigan Central and with the Grand Rapids & Indiana. By the construction of a bridge across the Ste. Marie River it will connect with the Grand Trunk and with the Canadian Pacific. The line will touch at all the iron-ore ports on Lake Superior and will pass through the Gogebic and Marquette iron ranges. The route runs due east from Duluth to Sault Ste. Marie. There a bridge is to be built, the charters for which have already been obtained from the United States and Canadian governments, and the construction of which will be immediately begun. There will be no engineering difficulties, and it will cost only \$1,000,000. At present there is a break of 90 miles from the Sault Ste. Marie easterly to Algoma, on the main line of the Canadian Pacific. This will be filled by that company without delay. Mr. F. P. Olcott, President of the Central Trust Co., is the Chairman of the syndicate committee, and \$8,000,000 cash has been subscribed and paid in. Mr. Cummings is the President of the company. On Wednesday the syndicate bought, as a portion of the line, the Detroit, Mackinac & Marquette Railroad, 152 miles in length, all completed, and they have arranged with the Northern Pacific for the use of its branch from Duluth to Ashland, Wis., 70 miles long. Brown, Howard & Co., of New York, have contracted for the building of the remainder of this line. They have purchased the steel, and have established their headquarters at Marquette. The work will be pushed with all possible rapidity."

Fitchburg.—A preliminary survey has been made for an extension of the Shirley Branch from Greenville, N. H., to Windsor, Vt., by Peterboro, Hancock Junction and Claremont.

Grand Rapids & Indiana.—On the new Muskegon Branch, which is built under the organization of the Muskegon, Grand Rapids & Indiana Co., track is reported laid from Grand Rapids, Mich., west by north to Berlin, 12 miles, and from Muskegon east by south to Ravenna, 18 miles. This leaves only 11 miles to be completed, and it is expected that the road will be opened for traffic in November.

Gulf, Colorado & Santa Fe.—Work is being pushed on the extension of the Dallas Branch, and the track is now laid to Celeste, Tex., the crossing of the Missouri Pacific, 52 miles northeast from Dallas. It is expected that the track will reach Honey Grove by the middle of November.

Houston & Texas Central.—The trustees under the mortgage have applied to the United States Circuit Court for leave to sell certain lands at public sale. The sale is needed to avoid forfeiture under a clause in the land grant providing that a large part of it should revert to the state, if not sold or conveyed to settlers within 14 years from the date of the grant. A late dispatch says that the Court has granted the order asked for.

Indiana, Bloomington & Western.—In the United States Circuit Court in Indianapolis, the Central Trust Co., of New York, has filed a crossbill asking for the appointment of a new receiver under the mortgage of which it is trustee. The bill alleges that the security under the mortgage is insufficient, and asks for an injunction to prevent the company, from disposing of any of its property.

Illinois Central.—The statement for September shows earnings from traffic as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Illinois and Southern Div.	\$926,028	\$934,229	D. \$8,201	0.9
In Iowa	182,591	167,288	I. 15,303	9.2
Total	\$1,108,619	\$1,101,517	I. \$7,102	0.6

The Land Department reports sales of 1,032 acres for \$4,820, and cash collections amounting to \$8,749 for the month.

Knox & Lincoln.—A committee has been appointed by the town holding stock in this company to consider the question of a sale or lease of the road. The Maine Central Co. is the only probable purchaser.

Lake Mahopac & Connecticut.—This company has filed articles of incorporation to build a railroad from East Fishkill, N. Y., to Lake Mahopac and thence to a connection with the New York City & Northern and the Harlem roads. Surveyors are now locating the line.

Lake Shore & Michigan Southern.—A suit has been begun by G. W. Thomas and Thomas S. Hughes, bondholders, to foreclose the mortgage on the Chicago & Canada Southern road, which has been for some time owned and operated by this company. The bill represents that no interest has been paid for several years, and that the unpaid interest now amounts to very nearly the sum of the principal.

Lehigh Valley.—This company has ordered extensive additions to the improvements on the Tift Farm tract in Buffalo, N. Y. A freight house 440 ft. long is to be built on canal No. 1, the contract having been let to J. E. McIntyre, of Buffalo. An addition 300 ft. by 116 ft. is to be built to the lake freight house, and the second canal, 2,400 ft. long, is to be docked on both sides for its whole length.

It is reported that this company has bought the unfinished Pennsylvania, Slatington & New England road, probably with the intention of completing it. The report needs confirmation.

Little Rock & Fort Smith.—This company announces that in accordance with the terms of its scrip issued for bond coupons, the certificates issued for coupon No. 6 will be paid on Dec. 1. Under this call about \$94,000 of the scrip (first issue outstanding) will be retired. The company has recently made an effort to secure an investment for the proceeds of its land sales in its own scrip, by filing a bill in the United States Court at Washington, asking that this right be granted. Under the indenture it is restricted to an investment of its land money in the bonds of a price not exceeding 110. As the present market value of these is 116, it is impossible to buy them, and as, if the Court should grant the petition, the scrip could be taken at par, it would manifestly be of advantage to the company to so place these funds. A decision in the matter is looked for between now and Jan. 1, and if the right desired is granted, another \$100,000 of the scrip will be called this year.

Little Rock, Mississippi River & Texas.—It is said that in the approaching reorganization of this company two companies will be formed. The main line from Arkansas City to Little Rock will be taken by one company and will possibly be consolidated with the Little Rock & Fort Smith. The Western Division will be taken by another company, which will make arrangements to complete it through to the Texas line.

Macon & Florida Air Line.—Work is shortly to be begun on this company's line from Macon, Ga., southward. An attempt has been made by other parties to secure the line, but this company claims an exclusive charter.

Mammoth Cave.—Track is reported laid on this road, and it will be opened for business early in November. It is 9

miles long, extending from Glasgow Junction, Ky., on the Louisville & Nashville road, north by west to the famous Mammoth Cave.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of Oct. 16:

The street railroads of Puebla, which have proven a profitable investment, are wholly under the control of the owner, Mr. Leonardo Fortuño, residing at this capital. There are no stockholders or bonds of any sort. The representative of the owner at Puebla, and the active manager of the railways, is Mr. Mariano Fortuño, a gentleman of business ability, who has been very successful in the management of the enterprise. The present extension of the lines at Puebla is about 10 kilometres, but, the coming week, work will be begun on new lines which will add greatly to the value of the system as originally planned by Mr. Fortuño. The material for the lines comes from England and the United States, the steel rails from the former country and the rolling stock from the latter. A striking feature of the property is the depot which embraces car houses and stables, the whole built in the most substantial, and, indeed, elegant manner, forming an embellishment to the city. A personal examination of the rolling stock showed us that it was first-class in every respect, and the care taken of the animals employed for traction was commendable. The lines are in perfect order. The rates for tickets are 6 cents for first-class and 3 for second. This wholly Mexican enterprise is but another illustration of the ample field which exists here for the profitable employment of native capital.

The report that the National Railway will, on April 1, 1887, pass into the control of the English bondholders is quite premature. It is not unlikely, in view of the rapid advance in the price of the bonds of the road since the provisional agreement for a reorganization was signed at this capital some days since, that the American bondholders will furnish the *pro rata* of the money required to complete the main line, coal branch, etc. In this case the American interest would continue to dominate the road. The English holding of National bonds is about \$9,000,000 out of a total of \$24,000,000, thus leaving \$15,000,000 held in the United States. Under the terms of the agreement recently signed here by Gen. Palmer and Mr. Smithers of London, the main line from the frontier to this city is set apart from the Pacific Division, and the money to be raised will be represented by a prior lien bond on the trunk line only, the Pacific Division remaining in the hands of the construction company. In the judgment of conservative persons, well acquainted with the National road, the placing a prior mortgage of from \$8,000,000 to \$10,000,000 on the main line will be a sound 6 per cent. investment. It will require of this amount about \$6,000,000 to complete the trunk line and the coal branch, and the rest of the money is needed for equipment and other expenses. The total amount to be raised, at the utmost, will not amount to over \$10,000 per mile of the bonded property, which certainly is a good investment. The bondholders residing in the United States are very likely to demand the privilege of subscribing to the new loan and in that case it will be impossible for English capital to gain control, as the money placed in the prior lien mortgage will govern the road. If the American bondholders desire to take up their proportionate share of the new fund, they can do so, and the indications now are that they will find it to their interest to secure control of the road they originally built.

New York Central & Hudson River.—The corrected statement of gross earnings is as follows:

	1886.	1885.	Increase.	P. c.
Quarter ending Sept. 30.	\$3,058,548	\$2,437,068	\$620,880	25.5
Quarter ending Sept. 30.	8,717,147	6,053,415	2,663,732	44.0
Year ending Sept. 30.	30,506,360	24,429,441	6,076,919	20.8

The West Shore earnings are included for nine months of last year.

Ohio River.—This company's engineers are now making a survey for an extension from Point Pleasant, W. Va., to which place the road is nearly completed, southward to Huntington, a distance of about 45 miles. At Huntington connection will be made with the Chesapeake & Ohio road.

Orlando & Winter Park.—This company has been organized at Orlando, Fla., to build a short branch line from that town to Winter Park, a distance of 5 miles.

Richmond & West Point Terminal Co.—As noted briefly last week, the directors of this company at their last meeting adopted a resolution calling a general meeting of the stockholders to be held at Richmond, Va., Nov. 19. In the preamble to the resolution the contract of April 16, 1886, with the Richmond & Danville Railroad Co. is set forth, but the directors state that the Terminal Co., by reason of lawsuits, injunctions, etc., have not reaped the benefits expected thereby. The preamble then states that the directors fear their ability to any longer successfully provide for the floating indebtedness and the interest charges, as well as the trust-note obligation, which will mature on Jan. 1 next, without seriously impairing or sacrificing the assets of the company, and that they deem it best to call the stockholders together to consider the situation and adopt means to provide for it.

Rome, Watertown & Ogdensburg.—The statement for the eleven months of the fiscal year from Oct. 1 to Aug. 31 is as follows:

	1885-86.	1884-85.	Increase.	P. c.
Earnings	\$2,119,507	\$1,536,073	\$583,434	38.0
Expenses	1,254,805	998,224	256,581	25.8
Net earnings	\$864,702	\$537,849	\$326,853	60.8

The earnings of the leased Utica & Black River road are included this year, but not last year.

St. Louis & Chicago.—The injunction obtained by J. B. Johnson & Co., contractors, to restrain this company from operating the completed sections of its line has been dissolved by the Circuit Court of Sangamon County, Ill. The company will at once make arrangements for operating the line from Litchfield, Ill., to Springfield, and for completing the extension to Peoria.

St. Louis & San Francisco.—All the contracts are now let for grading the extension from Fort Smith, Ark., to Paris, Tex., and grading is in progress for nearly 20 miles from Fort Smith. The work includes a tunnel one-half mile long through a spur of the Ozark Mountains. This will not cause delay, however, as a temporary switch-back will be laid over the mountain for use until the tunnel is finished.

San Antonio & Aransas Pass.—A dispatch from Corpus Christi, Tex., Oct. 24, says: "An important project has come to light here in connection with the construction of the San Antonio & Aransas Pass road, which will be completed to Corpus Christi in a few weeks. The new project is to establish a new deep-water port on the Texas coast, where the largest vessels and steamers can lie beside the wharves. To accomplish this, the railroad company, it is asserted, will found a new city on Padre Island, 20 miles from Corpus Christi, which will be the Gulf terminus of the system of roads centering at San Antonio, tapping the cattle and wool districts. After crossing Padre Island the company will build an iron pier 200 yards into the gulf, and thus reach 35 ft. of water. New York capitalists, it is understood, are backing the enterprise. The company has obtained title to Padre Island and bought a large quantity of land opposite it."

Santa Rosa.—This company has been incorporated to build a railroad from Santa Rosa, Cal., to Benicia, a distance of about 50 miles.

Selma & New Orleans.—This road has been bought for \$80,000 by Messrs. E. K. Carlisle, J. W. Crenshaw, A. M. Fowkes and A. W. Jones. It is said that the purchasers intend to make it part of the Mobile & West Alabama road. It is in operation from Selma, Ala., to Martin, 20 miles.

Sheffield & Birmingham.—Track on this road is reported laid to Russellville, Ala., 20 miles southward from the starting point at Sheffield on the Tennessee River. Work is progressing steadily on the line.

South Pennsylvania.—The *Pittsburgh Chronicle-Telegraph* of Oct. 25 says: "It is stated on the best authority that under agreements now in existence a majority of the stock in South Penn will be controlled at the next meeting by those who wish for an early completion of the road and who will so vote."

"The same authority states that the 10 Pittsburghers who control \$5,500,000 of the \$15,000,000 of stock, all agree now as to the advisability of completing the road."

"A list of stockholders as it stands now shows that \$5,500,000 of the stock is held in Pittsburgh. In addition to this there is said to be at least \$5,000,000 more ready to go ahead. The stockholders formerly willing to sell now protest that any further legal proceedings by the Pennsylvania Railroad will be merely for delay and they will object to it. They do not want to have their money tied up any longer in an unproductive shape. They say they are willing to put more money into the company in order to hurry things up and complete the line. As to its money-making powers there are no two opinions."

"The majority of stock certificates are still held in trust by J. Pierpont Morgan, and it is expected he will turn them over on demand, as well as such stock as was issued. In March, 1885, in payment for work done and charters obtained, the South Penn Co. issued to the American Construction Co., which was building the road, 95,000 shares of stock. Of this amount the company retained 18,560, of the remainder 76,440 shares went into the hands of a committee composed of W. K. Vanderbilt, H. McK. Twombly, F. B. Gowen, D. Hostetter and H. F. Dimock, who gave Mr. Twombly 60,000 shares (with a face value of \$3,000,000) and retained 16,440 shares. This is all the stock that has ever been issued."

"The meeting of South Penn will be held shortly and then there will no doubt be harmonious and concerted action."

Strikes.—The strike of the switchmen at St. Paul and Minneapolis came to an end by Oct. 23. The strike was substantially a failure, many of the men returning to work on the company's terms, while a few only remained out and they were replaced by new men.

The switchmen employed in the Louisville & Nashville yards in Louisville, Ky., struck on Oct. 21, asking an increase in pay. On the following day they were joined by a number of brakemen, and for a time the company was unable to move freight, and the yards were blocked. On Oct. 23, a committee of the strikers held a conference with officers of the company and a compromise was agreed on. The switchmen are to receive an increase of 25 cents per day, and the brakemen to be paid hereafter by the trip, the rate not to exceed 2 cents per mile. The adjustment of brakemen's wages and the trip pay system is to be extended over all the company's lines. This agreement was satisfactory and the strikers returned to work at once.

Toledo, Ann Arbor & North Michigan.—Track is reported laid on the extension of this road from Hamburg, Mich., to Owosso, 17 miles. This completes the connection between the Southern and the Northern divisions of the road, and gives the company a continuous line from Toledo, O., to Mt. Pleasant, Mich., 163 miles. Freight trains are running over the new line, but it is not yet opened for passenger business.

Troy & Greenfield.—The *Boston Advertiser* of Oct. 23 says: "It is regarded as more than probable that the coming Legislature will be called upon to take some action in the matter of the Troy & Greenfield road and Hocac Tunnel property. As is well known a bill was passed by the Legislature two years ago looking toward a disposal of this property of the commonwealth. This bill provided for the incorporation of a new company within three months, or this failing, for the consolidation, within three years after the passage of the bill, of any connecting road with the Troy & Greenfield. Thus far nothing has been done under this act, and, so far as is known, no overtures have been made on the part of any road for a consolidation. The section of the act providing for the incorporation of a new company, is, of course, rendered inoperative by the expiration of the time allowed for such action. The contract under which the Fitchburg road is operating the Troy & Greenfield will expire next August. It will, therefore, be imperative that some action be taken by the Legislature during the coming winter in the matter. The most natural disposition of the property would, of course, be to the Fitchburg, but in the event that that road makes no move toward a consolidation, or a renewal of the contract in some form, it is considered not entirely improbable that the Boston & Albany may bid for the control or purchase of the property, making connection with the Troy & Greenfield by means of the northern portion of the New Haven & Northampton at West Deerfield. It is regarded as more than probable that the coming session of the Legislature will witness a thorough ventilation of the entire vexed question, and possibly its solution. Whether this will be to the benefit of the people of the commonwealth remains to be seen."

Virginia Midland.—Notice is given that the new 5 per cent. consolidated bonds to be exchanged for the income bonds will be ready for delivery by Oct. 30. The new bonds will be guaranteed by the Richmond & Danville Co. under the terms of its lease of the Virginia Midland road, and the first coupon will be payable Nov. 1, 1886.

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Boston & Albany.

The following figures are from the report of this company to the Massachusetts Railroad Commission for the year ending Sept. 30 last.

The equipment consists of 245 locomotives, 219 passenger cars and 5,562 freight cars.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Freight department.....	\$4,909,083	\$3,705,929	I.	\$533,154 14.2
Passenger dept.....	3,689,848	3,412,814	I.	277,034 8.1
Miscellaneous.....	309,812	429,509	D.	119,697 27.8
Total.....	\$8,298,733	\$7,637,982	I.	\$660,751 8.7
Expenses.....	5,810,388	5,293,676	I.	516,712 9.9
Net earnings.....	\$2,488,345	\$2,344,306	I.	\$144,039 6.1
Gross earn. per mile.....	21.01	19.89	I.	1.12 5.7
Net.....	6.48	6.10	I.	.38 5.9
Per cent. of exps.....	70.0	69.3	I.	.7

The increase in earnings was apparently due in great part to the improvement in freight rates.

The result of the year was as follows:

Net earnings, as above.....	\$2,488,345
Interest, rentals, etc.....	\$741,421
Dividends paid.....	1,547,804
Total.....	2,299,225
Balance, surplus for the year.....	\$199,120

The usual quarterly dividends, amounting to 8 per cent. in all, were paid.

The traffic for the year was as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Pass. carried.....	9,726,907	8,874,030	I.	852,877 9.6
Pass. miles.....	177,787,439	167,097,784	I.	10,689,655 6.4
Tons freight carried.....	3,506,476	3,416,413	I.	90,063 2.6
Ton-miles.....	390,464,378	398,862,058	D.	8,397,680 2.1

Average rate:
Per pass.-mile..... 1.85 cts. 1.84 cts. I. 0.01 ct. 0.5
Per ton-mile..... 1.10 " 0.94 " I. 0.16 " 17.0

The casualties reported were 1 passenger, 11 employees and 4 others killed; 23 passengers, 140 employees and 61 others hurt. The average number of employees was 5,149 last year.

Indiana, Bloomington & Western.

This company owns a line from Springfield, O., through Indianapolis to Pekin, Ill., 342 miles. It leases the Peoria & Pekin Union from Pekin to Peoria, 10 miles, and the Cincinnati, Sandusky & Cleveland road, 190 miles, making 542 miles worked.

The Boston Advertiser publishes a statement for the year ending June 30 last, apparently from the report made to the Ohio Railroad Commissioner, the substance of which is given below.

The company has never published any reports or made any statements except a monthly statement of gross earnings.

The general account, condensed, is as follows:

Capital stock.....	\$10,000,000
Funded debt.....	14,137,300
Unpaid interest.....	\$200,587
Notes payable.....	833,097
Vouchers and accounts.....	485,030
Total.....	1,518,714
Road and property.....	\$25,656,014
Materials on hand.....	133,802
Sundry accounts.....	162,337
Accounts and balances receivable.....	202,283
Cash.....	10,702
Income account, debit balance.....	296,235
Total.....	25,656,014

Deducting cash and accounts receivable, the net floating debt is \$1,895,729. The funded debt includes \$1,000,000 first-mortgage preferred 7s; \$3,000,000 Eastern Division 6s; \$3,500,000 first 5s (6s after 1887); \$1,500,000 second 5s (also 7s from 1887); \$500,000 debenture 6s; \$71,800 convertible incomes and \$4,565,500 consolidated incomes.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Earnings.....	\$2,493,537	\$2,582,935	D.	\$89,398 3.4
Expenses.....	1,653,754	1,914,510	D.	260,756 13.6
Net earnings.....	\$839,783	\$668,425	I.	\$171,358 25.6
Gross earn. per mile.....	4.801	4.435	I.	.366 8.3
Net.....	1.548	1.140	I.	.408 35.9
Per cent. of exps.....	66.3	76.6	D.	10.3

Expenses include taxes, which last year amounted to \$37,642. Up to March 15, 1885, the company worked the Indianapolis, Decatur & Springfield road, 152 miles, in addition to the mileage given above.

The result of the year was as follows:

Net earnings, as above.....	\$839,783
Interest on funded debt.....	\$576,701
Rentals of leased lines.....	342,796
Total.....	919,497

Deficit for the year..... \$79,714
The deficit for the preceding year was \$108,765. As noted from time to time, the road is now in charge of a receiver, pending a reorganization of the company.

Ohio & Mississippi.

This company owns and works a line from Cincinnati, O., to East St. Louis, Ill., 338.05 miles; the Louisville Branch, from North Vernon, Ind., to Jeffersonville, 53.34; the Springfield Division, Beardstown, Ill., to Shawneetown, 224.86; a total of 616.25 miles of road, with 114.70 miles of sidings. The report is for the year ending June 30.

The equipment includes 127 locomotives; 48 passenger, 4 parlor, 12 combination, 5 mail, 16 baggage and 10 express cars; 2,077 box, 144 stock, 86 flat, 534 coal and 68 caboose cars; 2 officers' cars and 1 pay car, 6 tool, 1 derrick, 44 gravel and 5 camp and work-train caboose cars.

The general account, condensed, is as follows:

Capital stock account.....	\$24,030.00
Funded debt.....	15,570,000
Floating debt.....	1,056,599
Other liabilities.....	63,894
Total.....	\$40,970,493
Road and property.....	\$33,624,730
Sinking funds.....	272,460
Materials on hand.....	104,001
Accounts receivable.....	69,811
Balances receivable.....	294,518
Cash.....	24,885
Profit and loss.....	6,579,998
Total.....	40,970,493

The funded debt includes \$271,000 old West Division bonds past due and held by the trustees of the sinking fund; \$6,501,000 first mortgage 7s; \$112,000 sterling consolidated 5s; \$3,761,000 second-mortgage 7s; \$2,009,000 Springfield Division 7s and \$3,216,000 first general mortgage 5s. The amount of the general mortgage 5s authorized is \$16,000,000; of this amount \$12,383,000 are reserved to take up prior liens.

The earnings for the year were as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Freight.....	\$2,227,255	\$2,063,546	I.	\$163,707 7.9
Passenger.....	1,191,589	1,330,948	D.	139,359 11.7
Mail and express.....	253,075	250,971	I.	2,104 0.8
Total.....	\$3,671,919	\$3,645,467	I.	\$26,452 0.7
Expenses.....	2,597,708	2,670,736	D.	73,028 2.7
Net earnings.....	\$1,074,211	\$974,731	I.	\$99,480 10.2
Gross earn. per mile.....	5.958	5.918	I.	.04 0.7
Net.....	1.743	1.581	I.	.162 10.2
Per cent. of exps.....	70.75	73.26	D.	2.51

Earnings were reduced by a light wheat crop along the line, by the derangement of business resulting from the Missouri Pacific strike, and by the low rates on through business which prevailed for a considerable part of the year.

The expenses last year were divided as follows:

	Amount.	Per cent.
Conducting transportation.....	\$1,021,344	27.81
Motive power.....	653,623	17.81
Maintenance of cars.....	183,973	5.01
Maintenance of way.....	512,426	13.95
General expenses.....	226,333	6.17
Total.....	\$2,597,708	70.75

Taxes are included in expenses; they amounted last year to \$107,152, or 2.92 per cent. of gross earnings.

The division of earnings last year between the Main Line (including Louisville Branch) and the Springfield Division was as follows:

	Main Line.	Spring. Div.	Total.
Earnings.....	\$3,322,399	\$349,520	\$3,671,919
Expenses.....	2,197,000	400,708	2,597,708
Net earnings.....	\$1,125,399	\$51,888	\$1,177,287
Gross earn. per mile.....	8.489	1.554	5.938
Net.....	2.875	0.875	1.743
Per cent. of exps.....	66.12	114.65	70.75

* Deficit.

Interest on the Springfield Division bonds was \$140,630, making the total loss on that division \$191,818 for the year.

The result of the year was as follows:

Net earnings, as above.....	\$1,074,211
Interest on funded debt.....	1,026,415
Surplus.....	\$47,796
Second-mortgage sinking fund.....	53,000
Deficit for the year.....	\$5,204

The sinking fund trustees now hold balances amounting to \$272,460, applicable to reduction of funded debt.

The traffic for the year was as follows:

	1885-86.	1884-85.	Inc. or Dec.	P. c.
Pass. train-miles.....	1,247,355	1,477,474	D.	130,119 8.8
Freight.....	1,760,763	1,670,824	I.	89,939 5.4
Total loco. miles.....	4,232,534	4,428,148	D.	195,614 4.4
Pass. car-miles.....	6,729,073	7,331,294	D.	602,221 8.2
Freight.....	36,694,834	32,051,385	I.	4,643,449 14.5
Passengers carried.....	1,046,875	1,107,218	D.	60,343 5.5
Passenger-miles.....	57,448,868	64,819,413	D.	7,370,545 11.4
Tons freight carried.....	1,563,550	1,373,977	I.	189,573 15.5
Ton-miles.....	318,980,893	253,211,829	I.	65,769,064 26.0

Average rate:
Passengers, No..... 42.64 43.87 D. 1.23 2.8
Freight, tons..... 181.16 121.55 I. 29.61 19.5

The average train last year was 4.994 passenger or 20.840 freight cars. The average earnings per passenger train-mile were: Passengers, 88.439; mail and express, 18.783; total, 107.222 cents. The average earnings per freight train-mile

were 126.494 cents, an increase of 2.4 per cent. Of the freight car mileage, 74.99 per cent. was of loaded cars. Locomotives ran 1.38 miles to each revenue train-mile. Locomotive service cost 15.73 cents per mile run. The average passenger journey was 54.873 miles; the average freight haul was 201.053 miles.

The motive power is now in good condition. Some improvement in the passenger cars is needed, and many of the freight cars are old and light.

Renewals of track included 2,167 tons of steel rails and 150,594 new ties; 32 miles of track were ballasted and 2.47 miles new sidings added. Much work was done on bridges. On the Springfield Division 63,029 new ties were used and 383 ft. new trestle built.

The company has made a contract to use the new bridge of the Kentucky & Indiana Bridge Co., at Louisville, obtaining thereby a considerable reduction in bridge tolls and terminal charges, room for yards and buildings in Louisville, and the right to run its own trains into that city. President Peabody's report says:

"Seven miles of road will be required to be built (the right of way being provided free to the company) from the station of Watson, on the Louisville Branch, to the city of New Albany, Ind., the contract giving us such terminals in New Albany as are necessary for working our business across the bridge. Among the many favorable conditions of this contract, the placing of your line into the city of New Albany is probably the most important. This is a large manufacturing city of 30,000 inhabitants, with a large business the year round for the Eastern and Northern markets, and undoubtedly will add largely to the revenues of the company. The proposed line will also pass through the celebrated cement works of Southern Indiana, whose product equals a full train of freight daily."

"On condition of the donation of 60 acres of land and \$75,0